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**Information Literacy Competencies of Registered Nurses at Magnet
Hospitals**

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**Information Literacy Competencies of Registered Nurses at Magnet
Hospitals**

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Dedication

To my Father and his Son

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Information Literacy Competencies of Registered Nurses at Magnet Hospitals

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More patients are turning to the Internet as a source of health information. Nurses occupy the frontline of healthcare and must have information literacy (IL) competencies to guide themselves and their patients to the correct and appropriate health information on the Internet. Within magnet hospitals, which are exemplars for excellent nursing practice, there is an increased emphasis on evidence based practice and research, which requires IL. Exploring IL at magnet hospitals was reasonable considering such competence is promoted. Previous research indicates that nurses lack IL competencies which are necessary to inform their patients and impact healthcare but many studies rely on self-report measures. The purpose of this research study was to objectively measure the information literacy competencies of registered nurses at magnet hospitals, specifically their competencies in accessing and evaluating electronic health information, self-perception of information literacy, reliance on browsing the Internet for health information (versus libraries), and the relationship among these competencies.

A convenient sample of 120 registered nurses, at four magnet hospitals, all components of a single healthcare organization, completed the Research Readiness Self-Assessment—Nurse (RRSA-Nurse), an interactive online instrument and a demographic data form. Data were analyzed using descriptive, correlation, and regression statistical methods. Nurses employed at magnet hospitals had a high ability to access and evaluate health information and high overall IL. Their self-perception in their abilities to access and evaluate health information was high and a majority did not rely on browsing the Internet for health information. Seven variables were significantly correlated to overall information literacy including role, graduate prepared nursing education, ability to access health information, ability to evaluate health information, library and research experience, contact with library staff, and library use. Nurses who were not reliant on browsing the Internet for health information and those with a graduate prepared nursing education had higher information literacy.

Further research is necessary to explore qualities within magnet hospitals that contribute to the promotion of information literacy competencies in nurses. Understanding these qualities may assist with the development of interventions to increase information literacy among practicing nurses.

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Chapter 1: Introduction

Registered nurses comprise the largest group of health care providers in the United States, with 2.6 million jobs held in 2008 (Bureau of Labor Statistics, 2010). They occupy the frontline of direct patient care, spending the most time with patients. Therefore, nurses are uniquely positioned to impact health care quality and patient safety, as noted in a recent Institute of Medicine (IOM) report (2011):

By virtue of their regular, close proximity to patients and their scientific understanding of care processes across the continuum of care, nurses have a considerable opportunity to act as full partners with other health professionals to lead in the improvement and redesign of the health care system and its practice environment. (p. 23)

The IOM identified significant threats to patient safety and healthcare quality, recommending that health care providers use evidence-based practice (EBP) and technology to improve patient safety and the efficiency and effectiveness of health care (IOM, 2003). Yet to do so, nurses require access to specialized knowledge and competencies.

At a time when patients are turning to the Internet for information about their health—the Pew Foundation reported that “eight million Americans with Internet access look online for health information on a typical day” (Fox, 2006, Summary of findings section, para. 2)—33% of registered nurses “frequently” used the Internet to find nursing information when they needed it (Pravikoff, Tanner, & Pierce, 2005). However, the quality of Internet health information varies, and many patients and nurses lack the competencies to identify authoritative online information. As the frontline providers of health care, nurses are positioned to teach patients how to find quality health information

on the Internet, so nurses should be more adept at doing so than are their patients. Yet few studies have examined the ability of nurses in practice to find, evaluate, retrieve, manage, and share online health information.

Evaluating online health information—one of six competencies that constitute information literacy—requires an individual to determine the extent of information required, access information effectively, evaluate both information and resources, incorporate information, use the information, and understand the context of use (Association of College and Research Libraries, 2000). Information literate nurses can use online health information and research, developing information literacy competencies to support both evidence-based practice and effective patient education. This chapter provides background on the state of information literacy in nursing, addressing the purpose and significance of the present study as well as defining major concepts, assumptions, and study limitations.

BACKGROUND

Within healthcare there has been an increased emphasis on evidence-based practice (EBP), which is defined as “the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients” (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996, p. 71). But with over 2 million articles published annually in 20,000 biomedical journals, most health care providers would need to read 19 articles a day to remain current (Australian Cochrane Center, 2008). However, it is not evident that health care providers, such as nurses, have the information literacy necessary to search for and evaluate health information such as scientific articles. As Rosenfeld (2002) pointed out, many EBP models assume that clinicians and students

already have these competencies. But it is unclear whether they know about the wealth of information available and if they can find it efficiently.

Evidence-based practice and academic research also play a significant role in the Magnet Recognition Program awarded by the American Nurses Credentialing Center (ANCC). Magnet hospitals excel in the development of the professional nurse practice environment. More hospitals are expected to seek magnet status in the future in order to attract nursing staff and demonstrate their commitment to high standards of patient care. According to the outcome analyst at the Magnet Recognition Program of the ANCC, the percentage of magnet hospitals increased from 4% in 2007 to 6.6% in 2011, and there are 278 active magnet applications (C. Hagstrom, personal communication, April 18, 2011).

In 2008, ANCC revised the magnet model to eliminate redundant concepts (American Nurses Credentialing Center, 2008), leaving five components. The fourth component—New Knowledge, Innovation & Improvements—addresses evidence-based practice and research, incorporating an expectation that magnet hospitals provide infrastructure and resources to support the advancement of nursing research and evidence-based practice. That expectation includes magnet hospitals providing education for nurses about academic research and EBP and accumulating evidence that published research is systematically evaluated and used in the hospital by nurses.

Research has shown that the best examples of care environments that support the development of professional nurse practice are at magnet hospitals (Aiken, 2000; Lake & Friese, 2006). Magnet hospitals improve nurse practice environments in health systems with limited resources (Aiken, 2005), and even those hospitals that have some of the magnet hospital features achieve better nurse and patient outcomes (Aiken et al., 2008). It is well known that the magnet program is important in spreading best practices in nursing (McLaughlin & Bulla, 2010), and they serve as exemplars for nursing practice.

Therefore, because information literacy is a critical component of EBP and academic research, and because they in turn are central components of the magnet hospital environment, understanding information literacy among nurses at magnet hospitals will contribute to the growing body of evidence concerning the defining characteristics of magnet hospitals. Such insight will contribute to forging a better practice environment for nurses, which ultimately affects patient outcomes.

For many nurses, the first stop for health information is an Internet search engine, which yields large numbers of documents that have not undergone a peer-review process. Clearly, such nurses require more advanced competencies to identify quality, research-based evidence both on the Internet and from other trustworthy sources. Nurses who are information literate will be able to find quality health information to guide their own practice, teach their patients these behaviors, and act as advocates for quality information. Considering that the Internet is often the first stop for patients pursuing supplementary information regarding their healthcare—and that patients often turn to a nurse as a source for clarification of the health information they find—it is imperative to further understand nurses' information literacy concerning health information acquired from the Internet.

Very little research has addressed information literacy in the context of nursing practice, with most of the focus within nursing education. Fox (1989) described one of the first information literacy programs at a school of nursing, Pathways to Information Literacy, which was integrated into the nursing curriculum at the University of Northern Colorado with a goal to “develop student skills in locating, evaluating, and applying information for use in critical thinking and problem solving” (Fox, Richter, and White, 1996, p. 182). Subsequent to the initial work by Fox and colleagues, numerous nursing educators have conducted research on information literacy, typically conducting program evaluations using researcher-developed surveys. However, the tools and assessments

used to measure information literacy in nursing education have been varied and have not been assessed for their validity or reliability. A majority of the research has focused on nursing students rather than practicing nurses. At the time of the study, no guidelines existed for teaching information literacy—to either students or practicing nurses—specific to the nursing discipline, but recommendations by the Technology Informatics Guiding Education Reform group (2009) have been released, and they have been used as part of an adapted model to guide this study.

Information literacy in nursing practice is not well understood. Of the studies in nursing practice, one examined United States registered nurses' thoughts about their access to evidence and their ability to acquire it (Pravikoff, Tanner, & Pierce, 2005). The researchers concluded that nurses could find evidence on which to base their practice if they had training. But because nurses did not understand research, placed little importance on it, and lacked training, when nurses needed information, they were more confident in asking their colleagues, peers, or the Internet than using bibliographic databases such as PubMed or CINAHL (Pravikoff et al., 2005).

Rosenfeld and colleagues (2002) described an information literacy program in which staff nurses in an ICU took part in an information literacy training program. Among the lessons the researchers learned was that unit-based instruction presents significant obstacles for effective learning of new technological skills by staff nurses. Most studies on information literacy in nursing practice have used self-report survey methods, have failed to focus on competencies, and have focused only on unit-based instruction.

PURPOSE

The purpose of the present study was to examine the information literacy competencies of registered nurses working in magnet hospitals. Given the emphasis in magnet hospitals on nursing information literacy competencies, it was reasonable to conduct an initial study of nursing information literacy in hospitals that promote such competence. Specifically, the study addressed nurses' competencies in accessing and evaluating electronic health information, their self-perception of information literacy, their reliance on browsing the Internet, and the relationships among these competencies.

While the principal purpose of the study was to obtain a preliminary description of information literacy competencies among registered nurses, a secondary purpose was to provide further evidence of the reliability of an instrument developed to assess information literacy competencies among college students, for the purpose of determining its potential usefulness in evaluating information literacy competencies among nurses in clinical practice. The instrument had been used extensively with college-aged students and had been found to be reliable and valid for this group, but it had not been tested with nurses.

RESEARCH QUESTIONS

Eight research questions were addressed in this study:

1. What is the ability of nurses to access health information?
2. What is the ability of nurses to evaluate health information?
3. What is the overall information literacy competency of nurses with regard to health information?
4. What is the self-perception of nurses' ability to access and evaluate health information?
5. What is nurses' reliance on browsing the Internet for health information?

6. What are nurses' library and research experience in accessing health information?
7. What relationships exist among these six factors of information literacy?
8. What factors predict nurses' ability to (a) access health information, (b) evaluate health information, and (c) overall information literacy?

SIGNIFICANCE

The quest for reliable medical background information in nursing has been transformed by the digital revolution. Nurses, no less than patients, have come to rely on the Internet as a primary source of information. But while the Internet is a powerful tool, enabling access to a wealth of health information, it is also filled with potential for misinformation. Nurses should cultivate information literacy competencies for integrating health information from the Internet in their delivery of safe and expert care. But nurses also need information literacy competencies so they can assist patients and families in locating and evaluating online health information at a time when patients are taking a more active role in managing their own health care and that of family members. Yet, very few studies have focused on understanding the information literacy competencies of nurses in practice.

Recent evidence should draw attention to the wide variation in the quality of health information attributable to an unregulated Internet environment. Holland and Fagnano (2008), in a study supported by the Agency for Healthcare Research and Quality, reviewed 105 Web sites—identified through search engines—on the use of antibiotics for ear infections to see if they included the most up-to-date recommendations. They discovered that only 31% of the Web sites provided the new 'watch and wait' recommendation, 41% encouraged finishing the entire course of antibiotics, and only

14% included both recommendations (Holland & Fagano, 2008). These findings suggest that nurses must be aware of their own information literacy competencies if they are to protect patients from erroneous, potentially harmful information that is available online.

One of the few studies that have addressed the information literacy of nurses in practice focused on registered nurses' perceptions of their access to tools and their skills for obtaining background information (Pravikoff et al., 2005). The present study employed a measure of the information literacy competency of registered nurses rather than obtaining a participant report of self-perception of competency, an approach intended to provide targeted information to support the design of specific educational programs to improve nurses' information literacy competency.

Finally, research in nursing related to the concept of information literacy has focused primarily on evaluating nursing education programs. Many studies have used tools that have not been thoroughly evaluated for validity and reliability, and most research has occurred in Australia and the United Kingdom. A review of the literature revealed there is little research examining the concept among practicing nurses. Therefore, there was a need for further research in developing and testing an instrument to measure information literacy competencies among practicing nurses.

DEFINITIONS OF MAJOR CONCEPTS

The definitions of the concepts central to this study are presented below:

Electronic health (eHealth): "An emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies" (Eysenbach, 2001, Introduction section, para. 3).

Evidence-based practice: “The conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual patients” (Sackett et al., 1996, p. 71).

Gap (or information gap): “At the individual level, an encounter with a discrepancy or lack of ‘sense’ in a person’s environment” (Case, 2007, p. 332).

Health information literacy: “The set of abilities needed to: recognize health information need; identify likely information sources and use them to retrieve relevant information; assess the quality of the information and its applicability to a specific situation; and analyze, understand, and use the information to make good health decisions” (Medical Library Association, 2003, Definitions section, para. 5).

Information need: “A hypothesized state brought about when individuals realize that they are not comfortable with their current state of knowledge” (Case, 2007, p. 333).

Information seeking: “Behavior that occurs when an individual senses a problematic situation or information gap, in which his or her internal knowledge and beliefs, and model of the environment, fail to suggest a path toward satisfaction of his or her goals” (Case, 2007, p. 333).

Information literacy: “A set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” (American Library Association, 1989, para. 3).

Information technology skills: “Includes basic computer skills (keyboard, mouse, printer, file/disk management); standard software (word processing, spreadsheets, databases); and network applications (electronic mail, Internet, web browsers)” (SCONUL Advisory Committee on Information Literacy, 1999, p. 3).

Internet: “A huge global computer network, of which the world wide web is a component, established to allow transfer (exchange) of information from one computer to

another; it provides a diverse range of services used to deliver information to large numbers of people and to enable people to communicate with one another, such as via e-mail, real-time chat, or electronic discussion groups” (Bastable, 2008, p. 628).

Online: “Connected to, served by, or available through a system and especially a computer or telecommunications system (as in the Internet); also: done while connected to such a system” (Merriam Webster Online Dictionary, 2009, para. 1).

Practicing nurse: One who engages in the act of professional nursing. See definition below.

Professional nurse: “The performance of an act that requires substantial specialized judgment and skill, the proper performance of which is based on knowledge and application of the principles of biological, physical, and social science as acquired by a completed course in an approved school of professional nursing” (Texas Board of Nursing, 2011, Definitions section, para. 2). In this study, the term is interchangeable with the term *registered nurse*. This study included registered nurses whose preparation included programs conferring associate, baccalaureate, masters, and doctoral degrees. Data were obtained concerning highest nursing degree attained, in anticipation that the variable could be a potential factor influencing information literacy competency.

Research: For the purposes of this study, the term *research* was used in a generic sense, as in “I’m going to Google (research) a health topic, which is indicative of such behaviors as searching, judging, and making decisions” (Ivanitskaya et al., 2006, Methods section, para. 2). The term does not carry the sense of a “systematic inquiry that uses orderly, disciplined methods to answer questions or solve problems” (Polit & Beck, 2004, p. 3). This latter sense of inquiry is referred to as *academic research* in this study.

World Wide Web or web: “A computer network of information servers around the world that are connected to the Internet; it is a technology-based educational resource that was created as a virtual space for the display of information” (Bastable, 2008, p. 638).

ASSUMPTIONS

Four assumptions were made for this study.

- Respondents to the research instrument answered honestly and accurately.
- The need for competency in information literacy in nursing will increase as more information technology (IT) systems are integrated into the healthcare system.
- Magnet hospitals, because of their characteristics, are more likely to demonstrate integration of research and evidence-based practice in nursing practice.
- The survey instrument was valid and reliable for use with nurses, because it had been so when used with similar groups. Nevertheless, reliability was assessed in the course of this study.

LIMITATIONS

Six limitations to the study were evident.

- The findings are limited to magnet hospitals in one geographic area, in one hospital system and are not generalizable to other hospitals, either magnet or non-magnet.
- While it was assumed that participants possess information technology (IT) skills to varying degrees, a minimum level of IT skills was necessary to take part. Therefore, respondents’ distribution of IT skills may be skewed toward higher levels.

- Findings were limited by the response rate of the participants in the hospital network.
- Participants were self-selected.
- Because the data were comprised of self-report measures, there are unique threats to validity but the principal advantage of self-report measures is that the researcher is not present, so if the experimental situation becomes uncomfortable or unrewarding, participants feel less pressure to remain in the experiment. As a result, there is greater guarantee of participants' protection (Nosek, Banaji & Greenwald, 2002).
- A correlational study cannot determine causality.

LIMITATIONS OF THE INSTRUMENT

The survey instrument had not previously been used exclusively with practicing nurses. It was used with 308 college-age students majoring primarily in a health-related discipline (Ivanitskaya et al., 2006), 243 freshmen in Georgia (Redmond, 2007), and most recently with 32 health administration graduate students (Ivanitskaya, DuFord, Craig, & Casey, 2008). However, in view of the similarities between previous research participants and the practicing nurses who were the target of this investigation, it was likely that the RRSA-Nurse would be reliable.

SUMMARY

The concept of information literacy in professional nursing practice was introduced, with description of a context that includes influences of the information age and the Internet on information literacy in nursing. The discussion provided the setting for discussing the study's rationale, research aims, and research questions. The conceptual framework and relevant literature are presented in Chapter 2.

Chapter 2: Review of the Literature and Conceptual Framework

This chapter examines how the Internet has impacted health information as background for a discussion of the study's rationale based on the literature on information literacy (IL) in nursing. Description follows of magnet hospitals, which are the setting for the study, with discussion of background factors and their relationship to information literacy in nursing. The chapter concludes with a discussion of information literacy standards, with a focus on nursing. Finally, the conceptual framework, which guided the literature review based on the suggested relationships between the variables, is described.

HEALTH INFORMATION AND THE INTERNET

First, to set the stage for this study, it is important to understand how patients use the Internet for health information. On most days, many Americans search for health information on the Internet, often with the assistance of someone besides the person who needs the health information. The search starts with a search engine and includes multiple Web sites (Fox, 2006). Over half of people searching for online health information obtain it before seeing a doctor or other health professional, though they still rely on professionals to authenticate the health information they've found. Of the 37% of people who reported talking to health professionals about their searches, 79% reported that the health professional was interested in the online information they found (Fox & Rainie, 2002).

Patients use online health information to supplement or to compensate for gaps in their health information or in health information provided by health care professionals, and they use the Internet to get second opinions, often because health care professionals do not appear to have the most up-to-date information. Rozmovits and Ziebland (2004)

found that participants in a cancer support group not only perceived health care professionals as hurried and poor communicators, but they also found the information provided was “patchy, inconsistent, contradictory, and haphazard,” and the professionals showed a preference for certain treatments over others.

Many health care providers are concerned about the quality of health information available online, but there are few instances of “actual harm” as a result of Internet health information (Crocco, Villasis-Keever, & Jadad, 2002). A nongovernmental organization—Health on the Net Foundation Code of Conduct (HONcode)—was created to oversee the ethical practices of participating operators of health information web sites. Although, participation is small and voluntary, those Web site operators who subscribe to the HONcode are considered credible (HON, 2011; Medical Library Association, 2011).

Activity by patients seeking health information has become such a substantial presence in the information landscape that even information companies mine the data this activity produces. For example, before visiting a healthcare provider at a clinic, many flu sufferers visit Web sites for information about symptoms and remedies. Google took advantage of this behavior and created a real-time tracker called “Google Flu Trends.” The tracker compares 50 million of the most common Google search queries to the flu-like illness rates reported by the U.S. Centers for Disease Control and Prevention’s (CDC) national surveillance program, and it narrows down to 45 search terms that are associated with the prevalence of flu symptoms data. The search terms are related to symptoms, complications, and remedies (Moisse, 2010).

Online health information seekers, such as college students, may lack the skills necessary to navigate the massive amount of information available online, and a recent study of college-aged health information consumers revealed that when presented with questionable Web sites on nonexistent nutritional supplements, only 50% were able to

correctly identify the Web site with the most trustworthy features (Ivanitskaya, O'Boyle, & Casey, 2006). Although many users are pleased with the information they find online, the Pew Research Center's Internet and American Life Project survey, Online Health Search 2006, revealed people have a variety of negative emotional responses when faced with information they find online. Many feel overwhelmed by the amount of information (25%), frustrated by the lack of information or their inability to find it (22%), confused, (18%), and frightened by the serious and graphic nature of the information (10%) (Fox, 2006).

Unfortunately, nurses do not routinely assess their patients' use and evaluation of online health information and have been slower than other health professionals in incorporating online health information into their practice (Gilmour, Scott, & Huntington, 2008). Perhaps it is because practicing nurses are unaware of their own competencies and lack the ability to guide their patients and themselves through the wealth of information available on the Internet. Others have suggested nurses' value personal contact which may hinder use of the Internet. Estabrooks and colleagues (2003) found that nurses in their study tended to prefer seeking information from other individuals more so than on-line sources. This finding has been supported in several other studies among nurses and nursing students (Dee & Stanley, 2005; Pravikoff et al., 2005; Secco et al., 2006; Winters et al., 2007).

With patients using the Internet to find health information, it is important for nurses to be aware of their own ability to find information online. Nurses need to be at least as skilled as their patients in finding health information on the Internet, so they are more knowledgeable than their patients about finding health information available on the Internet, and can serve as advocates for their patients. Developing competencies within nursing for finding and using online health information is critical for supporting patients

and families using the Internet. Assessing nurses' knowledge and how they find online health information is vital to nursing practice in the 21st century and beyond (Gilmour, 2008).

INFORMATION LITERACY IN NURSING EDUCATION AND PRACTICE

A review of literature relevant to information literacy revealed only one analysis, conducted in Finland where the focus was examining literature in health, nursing, and medical informatics (Saranto & Hovenga, 2004). The review revealed the term information literacy is used interchangeably with computer literacy and with other unrelated terms such as informatics awareness and computer experience and most importantly that it is a term not well defined in the literature. No literature reviews have been conducted exclusively concerning information literacy with nurses as the focus. Nor have literature reviews concerning information literacy in nursing examined the concept from a global perspective. One systematic review to address these gaps, examined informatics competencies and development among U.S. nurses (Hart, 2008); however, information literacy was not specifically considered in this review. The strength of the review lies in its assessment of literature from a global perspective.

For the present study, therefore, a systematic review was undertaken to identify how information literacy is understood and measured in nursing education and practice globally. The guiding research question was "What is the state of knowledge about information literacy in nursing education and practice globally?"

Four criteria were established for inclusion in this review. First, studies must have been published between 1998 and 2008. Second, studies must have been published in English. Third, the major subjects of the studies must have been nursing students or practicing nurses. Fourth, the primary focus of the studies had to be on information

literacy as defined by the American Library Association (1989). Articles that described programs and evaluations, were included if they met the criteria. Editorials, case studies, and reviews were excluded.

To identify articles, systematic electronic database searches were conducted of PubMed (MEDLINE); CINAHL; Dissertation Abstracts International; Library, Information Science & Technology Abstracts (LISTA); and Library Literature & Information Science (LIS). References in review articles and in included original publications were also screened for potentially relevant studies.

The searches focused on information literacy in nursing globally between 1998 and 2008. Keywords used were information literacy, health information literacy, health literacy, computer literacy, and information technology combined with nursing. The terms computer literacy and information technology were also included in searches, because they are often used as synonyms for information literacy.

Abstracts were independently screened to identify articles that potentially met the inclusion criteria. For candidate articles, full text versions were retrieved and screened to determine if they met inclusion criteria. Data extraction of relevant study information for articles meeting inclusion criteria was performed using a non-standardized form with relevant headings to collect information on author, year and country of study, objective, participants, methods, and potential strengths and limitations.

Abstracts for 95 citations were considered in this review, with 31 citations deemed eligible. For the studies that were deemed applicable to the topic, two categories were created: nursing education (60%, $n = 18$) and nursing practice (42%, $n = 13$). The study citations in nursing education were further divided into two subcategories: assessment (39%, $n = 7$) and program description (61%, $n = 11$). Among the 31 studies considered, 40% were conducted outside the U.S. ($n = 12$).

Nursing Education

The review revealed that most of the research on information literacy in nursing has been in nursing education.

Assessment

Seven studies on nursing education assessed the information literacy skills of nursing students and nursing educators. Three of the studies were dissertations (Chai, 2006; Payton, 2003; Pierce, 2000). Most of the studies were conducted in the United States (Dee & Stanley, 2005; Chai, 2006; Payton, 2003; Pierce, 2000).

A descriptive survey of graduating senior nurses in the United States examined the self-evaluation of information technology competencies (Fetter, 2009), using an instrument based on 43 novice nurse competencies in informatics developed by Staggers, Gassert, and Curran (2001). Students reported moderate information technology skills. They were most confident in their Internet, word processing, and systems operations skills. The students rated themselves the lowest on care documentation and planning, valuing informatics knowledge, IT skill development, and data entry competency. The researchers cautioned that there existed some confusion in informatics terminology and operational definitions as well as inconsistencies in informatics roles and levels leading to skill redundancy. They suggested that the confusion reflects the speed of information technology innovation and that there was a need in nursing to recognize that students are moving beyond acquiring informatics skills to integrating health information literacy into practice.

Dee and Stanley (2005) used questionnaires, interviews, and observations to address clinical nurses' and nursing students' current use of health resources and libraries and to identify deterrents to their retrieval of electronic clinical information. The researchers' primary purpose was to explore implications of their findings for health

science librarians. Participants were 25 nursing students in a graduate course in nursing informatics and 25 clinical nurses from a variety of practice settings. Their findings mirrored results from previous studies of nurses: they determined that both groups were most likely to rely on colleagues and books for medical information. Not surprisingly, a greater proportion of the students than of the clinical nurses used online databases, including CINAHL and PubMed, and the students were better trained than were the clinical nurses, but both groups lacked database searching skills.

In New Zealand, researchers used a survey to examine graduate nursing students' information literacy skills (n=123) (Gilmour et al., 2008). They too concluded that access to the Internet at work, training, and time for searching are needed for students to develop skills to use information technology effectively.

The survey, conducted by mail, revealed that most nurses had access to the Internet at home and at work. Nurses reported that they believed access to online health information improved their practice. Yet, some nurses indicated they had difficulty accessing computers at work and lacked time to search. Many nurses (64%) did not assess patient use of the Internet. Those who used the Internet for health information at least several times a week at work were more likely to assess patients' Internet use as compared with those who accessed the Internet several times a month or less ($\chi^2=7.560$, $df=1$, $n=108$). Nurses who assessed the quality of Web sites provided two reasons for not using a Web site: they couldn't determine who the author was and the site was too commercial. A majority of the nurses did check Web sites to determine who provided the information (91%) and when the site was last updated (83%) (Gilmour et al., 2008).

For nursing students and faculty in Sweden, researchers used a survey to examine their attitudes, skills and experiences using IT. A majority of both the students (66%, $n=247$) and faculty (92%, $n=52$) had access to the Internet in their homes, but the faculty

were not confident in students' IT ability and believed only 29% had sufficient IT skills. In comparison, slightly less than half (48%) the faculty believed they had sufficient IT skills themselves for their role as educators. Nursing students (41%) and faculty (31%) were not sure or did not know about their competencies in accessing online library databases such as CINAHL and PubMed for scientific papers. The European Computer Driving License was recognized as the standard for competency for computer skills and knowledge (Ragneskog & Gerdner, 2006).

Of the dissertations that explored assessment of information literacy in nursing education, one study investigated self-evaluation of computer and information literacy and the relationship to satisfaction with online classes and learning outcomes in MSN and BSN students (Chai, 2006). The researcher found a positive relationship between information literacy and student satisfaction with online classes and learning outcomes (Chai). The tool used to measure IL and computer literacy was researcher-designed and not standardized. Another dissertation study investigated the self-reported perceptions of literacy skills of faculty and students in BSN programs for conducting library research (Payton, 2003). The researcher found that nursing students' perceptions of faculty skill were higher than their perception of their own skill; nursing faculty's perceptions of their skill were higher than the student's perceptions of the faculty's skill; and nursing students' perceptions of their skill were higher than the faculty's perceptions of their skill (Payton). A third dissertation study conducted a needs assessment of the nursing education environment in relation to information literacy by surveying faculty members, BSN students, and MSN students (Pierce, 2000). The researcher found gaps in awareness of information needs, identification of information needs, knowledge of electronic resource utilization, and application of research to practice. Pierce made three suggestions: IL skill building should be enhanced among faculty and students, IL

programs should be integrated into curricula across all levels, and a research course should be implemented early in the curriculum.

A summary of findings from each study is provided in Table 1.

Table 1: Summary of Studies Reporting Information Literacy in Nursing Education with a Focus on Assessment, 1998-2008 (n = 7)*

Author, Year (Country)	Objective	Participants	Methods	Findings
Chai, 2006 (U.S.)	Correlate between learning style and computer and information literacy and satisfaction and achievement with online learning courses	62 MSN and BSN students	Survey, online	Positive relationship between information literacy and student satisfaction with online classes and learning outcomes
Dee & Stanley, 2005 (U.S.)	Examine clinical use of health resources and libraries and deterrents to their retrieval of electronic clinical information	25 nursing students, 25 clinical nurses	Survey, interviews, and observations	Participants were most likely to rely on colleagues and books for medical information
Fetter, 2009 (U.S.)	Assess self-evaluation of IT competencies	42 graduating BSN students	Standardized instrument based on 43 novice nurse competencies	Most confident in Internet, word processing, and systems operations skills. Rated the lowest on care documentation and planning, valuing informatics knowledge, skill development, and data entry competencies.

Author, Year (Country)	Objective	Participants	Methods	Findings
Gilmour et al., 2008 (New Zealand)	Identify ILS in relation to electronic media and health information and barriers to accessing this information	123 MSN students	Survey, mailed	Most had Internet access at home and work. They also believed access to online health information via the Internet improved their practice. However, some nurses indicated difficulty with accessing computers at work, as well as lack of time to search. Many did not assess patient use of the Internet. Those who used the Internet for health information at least several times a week at work were more likely to assess patients' Internet use as compared with those who accessed the Internet several times a month or less.
Payton, 2003 (U.S.)	Assess self-reported perceptions of faculty and students and levels of confidence in their abilities to conduct library research	105 BSN faculty, 176 BSN students	Survey	Nursing students' perceptions of nursing faculty's ILS were higher than students' perceptions of their own ILS. Nursing faculty's ILS perception of themselves was higher than nursing students' ILS perception of faculty. Nursing students' ILS perception of themselves was higher than nursing faculty's ILS perception of nursing students.
Pierce, 2000 (U.S.)	Assess nursing students' needs in relation to information literacy as a measure of readiness for using evidence-based practice	77 BSN and MSN faculty, 44 MSN students, 218 BSN students	Survey	Gaps in awareness of information need, identification of information need, knowledge of electronic resource utilization, and application of research to practice

Author, Year (Country)	Objective	Participants	Methods	Findings
Ragneskog & Gernder, 2006 (Sweden)	Identify self- reported attitudes, skills, and experiences using IT	247 nursing students (45 were RNs), 52 nursing faculty	Survey	A majority of both the students and faculty had access to the Internet in their homes but the faculty were not confident in students' IT ability and believed only 29% had sufficient IT skills. In comparison, slightly less than half of the faculty believed they themselves had sufficient IT skills for their role as educators.

*U.S. indicates United States; MSN, master's of science in nursing; BSN, bachelor's of science in nursing; IT, information technology; ILS, information literacy skills; and RN, registered nurse.

Program Description

Of the 11 studies that address information literacy (IL) programs in nursing education shown in Table 2, the majority were implemented in schools of nursing.

One of the earliest IL programs for baccalaureate students and faculty integrated information literacy throughout the entire curriculum (Verhey, 1999). Concepts of information literacy were threaded throughout the theory and practicum courses from the first semester to the final courses. For example, in health assessment courses in the first semester, three concepts of information literacy were taught: (a) the importance of IL for lifelong learning in nursing, (b) resources for nursing and health care information, and (c) the relationship between clinical information and other information resources. The developer and coordinator of the information literacy curriculum—a librarian and a nurse—provided guest lectures for students and consultation for students and faculty. Two program cohorts were evaluated descriptively. Pre-testing and post-testing of students revealed that they used bibliographic databases to search the literature. However, students did not perceive that they were successful in accessing information, and faculty members' assessment of students' ability to evaluate information did not change over time. The researchers cautioned that many confounding variables were not accounted for that could possibly have accounted for equivocal results (Verhey, 1999).

Another IL program integrated into the first semester foundations of a nursing course in an ADN program was found to have a positive effect on IL skills and, surprisingly, to have a “negative effect on attitudes toward the need for using the skills in their nursing practice” (Courey, Benson-Soros, Deemer, & Zeller, 2006, p. 320). This study also failed to gather data on confounding factors such as previous participation in a basic library orientation, grade point average, and library use.

Finally, an IL program that was guided by the Society of College, National and University Libraries (SCONUL) model and implemented in a diploma program in the United Kingdom was found to have a positive impact on skills and confidence (Craig & Corrall, 2007). However, the link between skills, confidence, and selected demographics was inconclusive due to small sample size.

Several evaluations of information literacy programs in nursing education have also occurred within the context of baccalaureate programs. Shorten, Wallace, and Crookes (2001) surveyed students in a control group and students who participated in a series of lectures in partnership with librarians to help BSN students become information literate. The researchers found that students in the information literacy program “performed better on a range of objective measures of information literacy, as well as reporting higher level of confidence in these skills” (Shorten et al., 2001, p. 86) in comparison to students in the control group.

Tarrant, Dodgson, and Law (2007) investigated an information literacy program in China offered in the first semester of a part-time, post-registration BSN program designed to enhance students’ information literacy skills. The program consisted of a 20-hour module with three assignments. The researchers found there was a statistically significant increase in all assessed competencies, using an information literacy scale to measure students’ perceived IL competencies and an academic writing scale to measure students’ perceived competencies with academic writing. The researchers reported values of 0.97 and 0.95 for Cronbach’s alpha coefficients for the information literacy and academic writing scales, respectively. They reported a content validity index of 0.93. One limitation of the study’s design was that only perceived competencies—not actual competencies—were measured. The researchers suggested two areas for further research: using comparison groups to measure students’ actual information literacy skills and

looking beyond an educational context to examine how information literacy skills affect nurses' subsequent practice.

Ku, Sheu, and Kao (2007) addressed the effectiveness of an information literacy program in Taiwan by comparing the level of IL in a group of RN-BSN students who received the program against a control group, using a 23-item scale they developed. The IL program was included in only one course, and they found a statistically significant improvement in all skills except information presentation. The researchers identified two major study limitations. First, the control group attended a course "Marriage and Family," and it was unclear whether differences in IL abilities between the two groups were due to differing course goals and teaching strategies or confounding factors that were not measured. Second, it was unclear whether improvement was due to IL education or to the women's health curriculum.

Several information literacy programs among MSN students have also been described and evaluated. Jacobs, Rosenfeld, and Haber (2003) considered an information literacy curriculum integrated into five core courses in an MSN program designed to increase information literacy competencies. They administered a 10-item multiple choice competency survey to students upon their entry into the MSN program and at one-year intervals. They did not assess the survey for reliability or validity, limiting the generalizability of the findings, nor did they use a comparison group. They derived baseline data from 130 surveys, finding that only 24.4 percent of participants were able to answer all the competency-based questions correctly. The researchers received 59 complete surveys from students on follow-up, comprising 45.4 percent of the original respondents. In the follow-up survey, 39 percent of participants were able to answer all six competency-related questions correctly. The data analysis could not control for the number of courses participants had taken at the time of the follow-up survey. Additional

studies addressing information literacy programs in MSN education are shown in Table 2 (Bachman & Panzarine, 1998; Fonteyn, 2001). MSN

Finally, two studies examined the content of the curriculum in relation to information literacy and information technology in baccalaureate nursing programs and higher; one study examined the perceived information technology content in nursing education programs (McNeil, Elfrink, Bickford, Pierce, Beyea & Averill et al., 2003, while another analyzed the qualitative data from the same survey (McNeil, Elfrink, Beyea, Pierce & Bickford, 2006). The earlier study showed there was an emphasis on computer literacy skills rather than information literacy skills and the later study discovered nursing educators and administrators didn't understand the difference between the two hence the lack of emphasis on information literacy skills in many nursing education programs.

In summary, a large number of educational programs have included information literacy in the nursing curriculum, but few of the programs based the curriculum on research findings or established standards and guidelines. Most of the programs were also developed without reference to clear, measurable outcomes, and most focused on computer literacy skills rather than information literacy skills. Finally, most of the programs relied heavily on self-perception of IL competencies; very few actually measured competency.

Table 2: Summary of Studies Reporting Information Literacy in Nursing Education with a Focus on Program Description, 1998-2008 (n = 11)*

Author, Year (Country)	Objective	Participants	Methods	Findings
Bachman &Panzarine,1998 (U.S.)	Evaluate an Internet course	20 RN-MSN students. Mean years in nursing: pilot group, 10.6; comparison group, 11.4	Author- developed self- report instruments, Stronge & Brodt's 20-item self-report Nurses' Attitudes Toward Computerization Questionnaire	Students who took the Internet course had more computer knowledge, reported greater computer skill, and used the computer more. Qualitative findings were similar. Students in the pilot group expressed more positive attitudes toward computerization than did students in the comparison group, but the difference was not statically significant.

Author, Year (Country)	Objective	Participants	Methods	Findings
Courey et al., 2006 (U.S.)	Evaluate a program designed to develop ILS of new nursing students and educate students about the role of nursing literature in lifelong learning and the effective practice of evidence-based nursing	58 first-year students in an ADN program (n = 39 control group; n = 19 treatment group)	22-item questionnaire	Information literacy program had a positive effect on ILS and a negative effect on students' attitudes toward the need for using such skills in nursing practice

Author, Year (Country)	Objective	Participants	Methods	Findings
Craig & Corral, 2007 (U.K.)	Investigate whether an information literacy program for preregistration students was effective in developing their skills and confidence	29 nursing students	14-item multiple-choice pretests and post-tests to measure changes in students' skills. Self- assessed confidence levels using Likert scale items. Two educational sessions in the first semester. Semi-structured interview to explore factors affecting confidence.	Positive impact on skills and confidence; evidence on link between skills, confidence, and demographics

Author, Year (Country)	Objective	Participants	Methods	Findings
Fonteyn, 2001 (U.S.)	Describe a research course that the researcher taught for APN students at University of San Francisco School of Nursing	22 APN MSN students volunteered	5 assignments	Mean rating of students' knowledge and understanding of EBCP was 4.7 post intervention and 2.9 pre intervention. Mean rating of skill using the Internet to support EBCP was 4.8 post intervention and 3.7 pre intervention.
Jacobs et al., 2003 (U.S.)	Evaluate information literacy curriculum integrated into 5 core courses in development in master's program	Master's students in nursing	10-item multiple-choice competency survey. 130 baseline surveys (June-September 2001), 59 follow-up surveys (May 2002)	Percentage of students who correctly answered questions increased

Author, Year (Country)	Objective	Participants	Methods	Findings
Ku et al., 2007 (Taiwan)	Explore effectiveness of an information literacy education program by comparing the level of information literacy in a group of BSN students who received education against a control group.	Convenience sample of RN-BSN students Experimental group n = 32 Control group n = 43	Survey developed by researchers: 23 items, 10-point Likert scale: response 2 weeks before course evaluation and after course evaluation	Statistically significant improvement in skills except information presentation

Author, Year (Country)	Objective	Participants	Methods	Findings
McNeil et al., 2006 (U.S.)	Analyze qualitative data from a national online survey of baccalaureate nursing education programs in the U.S. that focused on computer and information literacy in the nursing curriculum	266 programs, 172 nursing program administrators, 78 nurse educators	Collapsed 9 of the quantitative questions that asked for follow-up response into 3 questions	Responses indicated there was an emphasis on computer literacy skills rather than information literacy skills in nursing education programs. Nurse educators and administrators didn't understand the difference between information literacy and computer literacy and their related competencies. In light of these findings, recent nursing graduates probably lack the skills necessary to contribute to the future of nursing with regard to information management. Several barriers to expanding the nursing curriculum to include informatics content were identified, including a "lack of qualified faculty, resources, and need in clinical environments." Nursing faculty are not clear about what essential informatics content is or how to include it in nursing curriculum.

Author, Year (Country)	Objective	Participants	Methods	Findings
McNeil et al., 2003 (U.S.)	Report findings of a study examining perceived IT content of nursing education curricula in the U.S.	266 BSN and higher programs	Survey, online	Nursing programs were addressing computer literacy skills rather than information literacy skills.
Shorten et al.,2001 (Australia)	Evaluate a curriculum designed to help students become information literate	First- and second-year BSN students	22-item multiple-choice questionnaire, some open- ended questions. Pre-program questionnaires n = 108 Post-program questionnaires n = 71, Non-program questionnaires n = 72	Students who took the information literacy program performed better than those who had not.

Author, Year (Country)	Objective	Participants	Methods	Findings
Tarrant et al., 2007 (China)	Describe development and evaluation of a course module offered in the first semester of a part-time, post-registration BSN program to enhance student's ILS	159 part-time, post-registration BSN students in 3 consecutive cohorts	14-item questionnaire for information literacy, 6-item questionnaire for academic writing	Statistically significant increase in all assessed competencies
Verhey, 1999 (U.S.)	Evaluate an information literacy program in a BSN and alternative-entry curriculum	Students: n = 142 in 1992 n = 145 in 1996 Faculty: n = 19 in 1992 n = 13 in 1996	17-item self-report instrument to measure skills and confidence	1996 cohort showed increased use of CINAHL and library, showed more comfort with using journal literature, but expressed a greater lack of knowledge regarding use of resources. Yet significantly fewer faculty indicated no identification of specific ILS deficits in students.

*U.S. indicates United States; MSN, master's of science in nursing; RN, registered nurse; UK, United Kingdom; ADN, associate degree in nursing; U.K., United Kingdom; APN, advanced practice nurse; EBCP, evidence-based clinical practice; BSN, bachelor's of science in nursing; and IT, information technology.

Nursing Practice

Within nursing practice, information literacy has been examined from within the larger framework of information technology skills, informatics competencies, or Internet skills. To date, few studies have focused on information literacy in nursing practice. An exploratory survey by Pravikoff and colleagues (2005) revealed that registered nurses frequently needed information for practice and felt more comfortable using the Internet and asking colleagues than using bibliographic databases such as CINAHL or PubMed. The researchers concluded that nurses do not value research and have gaps in the information literacy and computer skills that would help them find resources to support their practice. The researchers recommended integrating IL, research use, and EBP in the curricula of all RN programs and increasing organizational support from nursing administrators for resources, time, and training. They also recommended that individual clinicians recognize gaps in their information-retrieval and evaluation skills

Rosenfeld, Salazar-Riera, and Vieira (2002) addressed information literacy in an intensive care unit, describing a pilot project to educate staff nurses about conducting patient-care related electronic literature searches. The educational program featured a one-hour unit-based educational session taught by a medical librarian and the unit educator. A Web-based tutorial was also developed to reinforce concepts taught in the one-on-one session. Weekly sessions were conducted for six weeks until all participants had received hands-on training. Participants included 29 bedside care providers and 3 assistant nurse managers. Participants were administered a pre-test and post-test based on New York University's information literacy criteria for competency in information literacy. Data were collected for the number of log-ons and searches in the intensive care unit for six months after completion of the educational program. The researchers

concluded that the number and quality of searches improved with time and that the level of competence in searching improved, though data for one month were lost. The researchers identified several other limitations as well, including the use of instruments whose reliability and validity had not been established. The most interesting findings, were that participants reported that they lacked enough time to conduct searches and lacked incentives to attend the educational sessions.

Three studies examining information literacy in nursing practice produced findings consistent with previous research, concluding that interpersonal information was the most frequently used source for information compared with computer-based sources (Secco, Woodgate, Hodgson, Kowalski, Plouffe & Rothney et al., 2006; Kosteniuk, D'Arcy, Stewart & Smith, 2006; Tannery, Wessel, Epstein & Gadd, 2007). One study identified a frequent Internet user they called the "information enthusiast," whom staff members consulted about finding information on the computer (Morris-Docker, Tod, Harrison, Wolstenholme & Black, 2004). Several studies also cited lack of training as the most frequent reason nurses reported for not using electronic information resources, a finding that is consistent with previous research (Gosling, Westbrook, & Spencer, 2004; Russell & Alpay, 2000; Winters, Lee, Besel, Strand, Echeverri & Jorgensen, 2007). Wozar & Worona (2003) found that provision of training was associated with increases in nurses' use of electronic resources. Tanner (2000) found that nurses with more education were more likely to use electronic resources. Such findings are enlightening in the context of findings such as those by Estabrooks, O'Leary, Ricker, and Humphrey (2003) that, despite having adequate Internet access at work, nurses' use of the Internet was still low compared with other groups.

Nursing administrators have identified searching electronic databases as one of the most critical information technology skills (McCannon & O'Neal, 2003), yet it is

evident from such findings that nurses continue to place greater value on interpersonal skills and lack the skills necessary to use electronic resources. The few studies of information literacy in nursing practice are largely descriptive; few studies have used a standardized assessment to examine information literacy among nurses in practice.

Table 3 presents a summary of findings of studies in nursing practice.

SYSTEMATIC REVIEW OF FINDINGS

The focus of most studies on information literacy in nursing education is on measuring Internet skills, information technology competencies, and information literacy competencies. Self-perception of skills is the focus of a majority of the studies, which are usually descriptive. No studies have objectively measured Internet skills, IT skills, or IL competency. The instruments used in the studies were researcher-designed with no assessment of reliability and validity reported. In only one study (Fetter, 2009) was the researcher-designed instrument based on standardized competencies, from the Staggers, Gassert, and Curran articulation of 43 novice nurse informatics competencies (Staggers et al., 2001). In most of the studies, researchers concluded that nursing students and nursing educators alike, regardless of age or experience, had poor skills or lacked skills—and reported moderate to low confidence in their skills—even though they had access to the Internet and computers at work or at home. In addition, little consensus exists among nursing educators concerning what competencies are necessary or about conceptual and operational definitions of information literacy. Most researchers have incorporated information literacy competencies within information technology skills, thereby indicating an inconsistency in defining information literacy in nursing.

Table 3: Summary of Studies Reporting Information Literacy in Nursing Practice, 1998-2008 (n = 13)*

Author, Year (Country)	Objective	Participants	Methods	Findings
Estabrooks et al., 2003 (Canada)	Compare nurses' Internet use to others' use by examining the type of information they were seeking as well as the frequency of accessing the Internet and where they were accessing it.	RNs in Alberta Survey 1 (1996): N = 600 Survey 2 (1998) N = 6256	Questionnaire, mailed	Over the life of the study, nurses increased their Internet and e-mail use at home and were comparable to other groups but despite workplace Internet access, their use was low compared to other groups.
Gosling et al., 2004 (U.K.)	Investigate factors influencing nurses' use of online evidence available at the point of care and to examine differences between nurses in different roles	N = 3128 Quota sample, 25% of staff in each of 4 professional groups: 1. enrolled nurses 2. RNs 3. CNS/midwives 4. CNC, nurse educators, senior nurses	Researcher-developed survey	58% of nurses had heard of the Clinical Information Access Program. Of those, 70% had used the Web site's resources. Lack of training was the most frequently cited reason for not using the Web site. Use of online evidence was associated with nursing role and with managerial and organizational support.

Author, Year (Country)	Objective	Participants	Methods	Findings
Kosteniuk et al., 2006 (Canada)	Examine the factors associated with the use of certain peripheral information sources among rural nurses by studying what central and peripheral information sources they used. Central information sources (colleagues, in-services, newsletters); peripheral information sources (Internet, library, journal subscriptions, CNE)	3933 rural RNs from October 2001 and July 2002	Survey, mailed	Nurses used central information sources significantly more than peripheral information sources. Nurses who had access to current information, sharing opportunities, higher education, positions of authority, and worked with health care students used more peripheral information sources. Several factors significantly predicted greater odds of nurses using the Internet for information including: recent graduate, a position of authority, multiple positions, a position that required using research, employed less than 5 years, or subscribed to a journal in the last 12 months.
McCannon & O'Neal, 2003 (U.S.)	Determine the IT skills that nursing administrators consider critical for new nurses entering the workforce	752 nurses obtained from 2000 randomly selected members of AONE	Questionnaire, mailed	Using e-mail effectively, operating basic Windows applications, and searching databases were critical IT skills. Most critical skill involved knowing nursing-specific software.

Author, Year (Country)	Objective	Participants	Methods	Findings
Morris-Docker et al., 2004 (U.K.)	In a longitudinal study, evaluate the impact of networked computers with 24-hour Internet access	97 nurses on 4 acute care wards in a large teaching hospital	Questionnaire, in-depth interviews	Most nurses used the networked computers and frequent users emerged called “information enthusiasts.” Factors relating to the organization, workplace culture, and training were identified as influencing Internet use.
Pravikoff et al., 2005 (U.S.)	Examined self-perception of RN skills to obtain evidence and access to tools to obtain it	760 RNs across the US	93-item questionnaire, self-report	Clinical RNs were more confident in asking colleagues or peers and searching the Internet than using bibliographic databases such as PubMed or CINAHL. RNs did not understand or value research and had little time or training to help them find evidence on which to base their practice.
Rosenfeld et al., 2002 (U.S.)	Determine lessons learned in a pilot information literacy program for staff nurses	29 ICU nurses, 3 assistant nurse managers	Staff development instructor and medical librarian held weekly sessions on unit for 6 weeks until all had hands-on training. Librarian made weekly visits.	Unit-based instruction presented significant obstacles: CNE units for participation were not considered sufficient reward or incentive; lack of time and environment were not conducive to learning

Author, Year (Country)	Objective	Participants	Methods	Findings
Russell &Alpay, 2000 (U.K.)	Obtain demographic information on RNs, barriers or restrictions to computer access, what nurses used IT for and how they used it, and satisfaction with IT training	225 nurses	Questionnaire	Nurses tended to be older and most worked part-time. 88% had access to a computer terminal. Nurses' main use of the computer was for medical records. Half used the computer for appointments and clinical coding. The least common use was to find health information and research articles. Three-fourths of the nurses said the computer made their work easier. Half the sample used a computer at any time, and 35% used the Internet outside of surgery. Training in basic IT skills occurred in <5%. Most nurses wanted more IT training but cited lack of time, money, and resources as barriers.

Author, Year (Country)	Objective	Participants	Methods	Findings
Secco et al., 2006 (Canada)	Describe nurses' use of information sources, barriers to information, and how a computer desktop information system might improve nursing practice	113 pediatric nurses Average age: 40.3 years Education: 65% nursing diploma; 33.6% university undergraduate degree; 1.4% master's degree Computer skill: 58.9% beginner-level; 39.3% comfortable using computer; 1.8% expert	Nursing Information Use Survey (NIUS)	Interpersonal information was the most frequently used source compared with either non-computer-based or computer-based information, which is consistent with previous research. Nurses used computers more frequently to e-mail than to search for evidence online. Greater computer skill contributed to use of more computer-based information.
Pierce, 2000 (U.S.)	Assess the information literacy of RNs and APRNs related to clinical information needed to facilitate evidence-based practice	181 RNs, 80 APRNs	Researcher-constructed questionnaire	40% of APRNs and 52.9% of RNs read nursing research less than once a month. More APRNs used electronic database searching than did RNs.

Author, Year (Country)	Objective	Participants	Methods	Findings
Tannery et al., 2007 (U.S.)	Evaluate information seeking of nurses at a rural community hospital pre and post access to an electronic library collection	Pre-access (2001) N=212 Post-access (2002) N=117	Validated instrument previously used with physicians, mailed 14 instructional sessions by librarian	Most nurses used a colleague as a resource to obtain clinical information both pre and post access. A difference between groups in relation to use of resources was not statistically significant. 20% of nurses used the library's electronic resources after 1 year of access
Winters et al., 2007 (U.S.)	Explore rural nurses' access, use, and perceived usefulness of research for rural practice	29 nurses	Semi-structured interviews, windshield survey	Most of the nurses used the term research to mean "gathering information." Preferred means of obtaining information was asking a colleague. When computers were available, nurses reported that poor computer literacy decreased their ability to quickly find and evaluate information.
Wozar & Worona, 2003 (U.S.)	Provide clinical nurses with accurate medical information at the point of care	4 staff nurses, 4 nurse care coordinators	2-hour hands-on class, developed Web page with access to resources, monitored usage	Participants accessed the project page 39 times in 30 days. The most accessed resource was Primary Care Online, which included 4 full-text nursing textbooks. The individual with highest usage accessed the project page 13 times.

*RN indicates registered nurse; U.K., United Kingdom; CNS, clinical nurse specialist; CNC, clinical nurse consultant ; U.S., United States; IT, information technology; AONE, American Organization of Nurse Executives; ICU, intensive care unit; CNE, continuing nursing education; and APRN, advanced practice RN.

SYSTEMATIC REVIEW SUMMARY

This review has identified several gaps in programs for education and professional development within the nursing profession, gaps that are contributing factors in practicing nurses' inability to conduct EBP. Similar to recent findings by a literature review on informatics competencies in the nursing workforce (TIGER, 2009); the gaps include (1) attention to information literacy skills and (2) failure to value the contribution of research to conducting effective practice.

The Technology Informatics Guiding Education Reform (TIGER) Initiative, a project of a coalition, consisting of over 70 nursing organizations representing over 2 million nurses, aiming to advance information technology outcomes in nursing education (TIGER, 2009), has identified information literacy as one component of its Nursing Informatics Competencies Model. TIGER has embraced the Information Literacy Competency Standards set by the American Library Association and it has modified them for nursing (TIGER, 2010). These standards are well known and identify well-defined performance indicators and outcomes.

Therefore, to meet gaps in information literacy skills and attitudes among nurses, it is recommended that the nursing profession embrace the standards set forth by the ALA, as modified for nursing by the TIGER Initiative, when measuring information literacy among nurses. This study used an instrument based on the ALA standards to objectively measure the information literacy competencies of nurses in magnet hospitals.

MAGNET HOSPITALS

Magnet hospitals are “associated with excellence in nursing, recognized for quality patient care and innovations in professional nursing practice, and provide consumers with a practical benchmark for selecting the hospitals where they can expect

good care” (McLaughlin & Bulla, 2010, p. xv). In addition, magnet hospitals play an important role in disseminating best practices in nursing. Therefore, examining information literacy within magnet hospitals is a logical first step in understanding the concept within nursing generally.

In 1981, a nursing shortage prompted the American Academy of Nursing (AAN) to appoint a task force to “examine the characteristics of systems impeding and/or facilitating professional nursing practice in hospitals” (McClure, Poulin, Sovie & Wandelt, 1983, p. 2). Academy members knew that certain hospitals, despite the shortage, had managed to create a place in which well-qualified professional nurses were attracted and retained, allowing such facilities to provide high-quality care. These hospitals were called “magnet hospitals” because of their attractiveness for these kinds of nurses. Therefore, the task force recommended studying these organizations to find out what factors were associated with their ability to retain nurses. The study—Magnet Hospitals: Attraction and Retention of Professional Nurses—was conducted among 41 hospitals and included interviews with directors of nursing and with staff nurses. The study found similarities, no matter the size of the hospitals, in the perspectives of directors and staff nurses regarding those elements that were “significant in making for magnetism” of their organization. The elements were categorized into three areas for analysis: administration, professional practice, and professional development (McClure & Hinshaw, 2002).

After the study, AAN challenged the American Nurses Association (ANA) to create a mechanism through which hospitals could apply for recognition as an “excellent health care organization” (Urden & Monarch, 2002). In response, the American Nurses Credentialing Center (ANCC) created the Magnet Recognition Program, providing the infrastructure for the program and designating the first magnet hospital in 1994 (Urden &

Monarch, 2002). Since the origin of the Magnet Recognition Program, 383 healthcare organizations in 40 states and the District of Columbia, as well as two healthcare organizations in Australia, one in New Zealand, one in Lebanon, and one in Singapore, have been recognized by ANCC (American Nurses Credentialing Center, 2011).

In order to identify the distinguishing characteristics of magnet hospitals, researchers have increasingly focused on specific quality outcomes, structures, and processes (Baloga-Altieri, 2008). For example, a program of research associated with outcomes of magnet hospitals has been established by the work of Linda Aiken and colleagues (Aiken, Smith, & Lake, 1994; Aiken, Sloane, Lake, Sochalski, & Weber, 1999; Aiken, Sloane, & Klocinski, 1997). They did not set out to study magnet hospitals; they were “seeking strategies to study how modifiable organizational traits of hospitals affect patient and nurse outcomes” (Aiken, 2002, p. 63). But it is not feasible to study organizational traits by randomly assigning hospitals into treatment and control groups, so it is useful to identify “natural experiments” or “targets of opportunity” to enable researchers to contrast hospitals with different organizational features. The magnet designation is one example of a “target of opportunity” (Aiken, Sochalski, & Lake, 1997). Magnet hospitals have demonstrated lower Medicare mortality rates (Aiken et al., 1994), lower mortality rates and higher patient satisfaction among AIDS patients admitted to hospitals (Aiken et al., 1999) and lower rates of needle stick or sharps injuries and near-misses among nursing staff (Aiken et al., 1997).

Conducting research and using evidence-based practice plays a major role in achieving magnet status. Seeking empirical evidence has always been an integral part of the magnet model, and a recent update of the magnet model in 2008 highlights its importance (American Nurses Credentialing Center, 2008). As noted by Pravikoff and colleagues (Pravikoff et al., 2005), the readiness of nurses to engage in evidence-based

practice relies on information literacy and computer skills. Therefore, because information literacy should be evident among nurses practicing in magnet hospitals, information literacy competencies are one proxy indicator of nurses' ability to transform health-related information—that is, evidence available online and through electronic databases—into evidence-based practice. Examining information literacy among nurses in magnet hospitals will also add to further understanding of the characteristics of magnet hospitals. Also, one of the primary goals of a magnet is to disseminate best practices in nursing; therefore, nurses at magnet hospitals are more likely to be information literate than are nurses at non-magnet hospitals.

OTHER FACTORS AND INFORMATION LITERACY

Research has suggested several background and personal factors that might affect the information literacy competency of nurses employed at magnet hospitals. These factors are discussed below.

Background factors

Access. Among rural RNs in Canada, those with access to the Internet and with access to current job-relevant information were more likely to use the Internet (Kosteniuk et al., 2006).

Age. Younger Internet users do not necessarily have more information literacy (Bond, 2004; Ivanitskaya et al., 2006).

Education. Self-perception of information literacy competency increases with education (Ivanitskaya et al., 2006). Students' grade point averages are highly correlated with overall information literacy skills (Ivanitskaya, 2009).

Gender. Women are more likely than men to seek health care and health information, and so they are the primary consumers of online health information (Fox & Fallows, 2003).

Role. The role a nurse has in the workplace determines whether he or she uses the Internet. Nurses in positions of authority are more likely to use the Internet (Gosling et al., 2004; Kosteniuk et al., 2006) and, therefore, are more likely to have better information literacy as compared to nurses in roles with less authority.

Personal Factors and Information Literacy

Internet beliefs. Nurses rely more on colleagues for information to do their work than on the Internet (Secco et al., 2006; Pravikoff et al., 2005), and they have a less-than-positive attitude toward computers than do physicians.

Library and research experience. Frequency of Internet use among nursing students is positively related to ability (Bond, 2004). Greater computer skills contributed to use of more computer based information among pediatric nurses (Secco et al., 2006).

Self-perception. The more frequently nurses use the Internet to find information the better they perceive their ability to search for and find such information (Bond, 2004). It must be noted that level of confidence does not imply level of competence. In fact, over confidence may be a measure of incompetence (Gross, 2005). One study failed to show a relationship between self-perceived abilities to access and evaluate health information and information literacy competency (Ivanitskaya et al., 2006): however, this relationship was considered to be an important factor in information literacy among practicing nurses. Therefore the relationship was examined in this study.

INFORMATION LITERACY STANDARDS

The last twenty years of information literacy research and development activities have focused on developing information literacy standards in education, from K-12 to higher education. Three library associations have developed standards and conceptual models for information literacy in higher education.

The Association of College and Research Libraries (ACRL), a division of the American Library Association, has developed 5 standards and 22 performance indicators that serve as a framework (Appendix 1) for assessing information literacy in higher education (Association of College and Research Libraries, 2000). Several tests of IL knowledge are based on ACRL standards, including the Standardized Assessment of Information Literacy Skills (2011), the iSkills Assessment by Educational Testing Service (2011), the Information Literacy Assessment in Technology (2011), and the Research Readiness Self-Assessment (RRSA), the instrument used in this study.

The Council of Australian University Librarians (CAUL) has created a framework derived from ACRL standards called the Australian and New Zealand Information Literacy (ANZIL) Framework (Bundy, 2004), consisting of six standards and nineteen performance indicators. One instrument, the Information Skills Survey (ISS), has been developed based on the ANZIL standards (2011). According to the CAUL archives, the ISS has been used with students studying education and law (2008).

The Society of College, National and University Librarians (SCONUL) in the United Kingdom convened a task force in 1998 to prepare a statement on the topic of information skills for higher education (SCONUL Advisory Committee on Information Literacy, 1999). The group created a model that combines basic computer literacy skills, IT skills, and IL skills. The model has seven headline skills, and at the base of the model are twin fundamental building blocks: basic library skills and basic IT skills. The model

recognizes iterative practice as a means to lead from being a competent user to an expert level of reflection and critical awareness of information as an intellectual resource—a progression from novice to expert. There are no tests of information literacy that use the SCONUL model as a framework, but one school of nursing has used the SCONUL model as a framework to guide curriculum design (Craig & Corral, 2007) and several U.K. universities have also used the model (SCONUL, 2004).

The next section describes conceptual models of information literacy developed within nursing.

INFORMATION LITERACY STANDARDS IN NURSING

There have been two conceptual models of information literacy developed within nursing (Pierce, 2004; Technology Informatics Guiding Education Reform TIGER, 2009). The primary focus of the models is to incorporate concepts of information literacy in nursing education. Pierce (2004) created an “integrated process framework” that combines the nursing process, evidence-based practice, and information literacy. The framework guided the inclusion of information literacy in the nursing curriculum at Northwestern Louisiana State University. The strength of the model is that it identifies teaching strategies for integrating information literacy and evidence-based practice in nursing practice and helps determine effective evaluation processes for learner outcomes. One major weakness of the model is that it does not consider the transition from information literacy novice to information literacy expert in the course of an individual’s educational experiences.

The most recent development in conceptualizing information literacy in nursing has been the Technology Informatics Guiding Educational Reform (TIGER) Initiative (Technology Informatics Guiding Education Reform, 2009). The TIGER initiative

brought together major nursing organizations in a summit to identify best practices in “information/knowledge management” and “effective technology capabilities for nurses.” The goal is to create and spread action plans within nursing, healthcare training settings, and other workplace settings (TIGER, 2011) so that practicing nurses and nursing students can be full partners in the “digital electronic era in healthcare” (TIGER, 2011).

The initiative has created a model that combines computer literacy, information literacy, and information management. Within the initiative there were nine collaborative teams of experts, one of which—the TIGER Informatics Competency Collaborative (TICC)—focused on informatics competencies (TIGER Informatics Competency Collaborative, 2008).

The team started with an extensive review of literature to seek informatics competencies for practicing nurses and nursing students. They collected informatics competencies from over 50 healthcare organizations, resulting in over 1000 competency statements that were organized into the three parts of the TIGER Nursing Informatics Competencies Model: basic computer competencies, information literacy, and information management.

Once the model was developed, each component was aligned with an existing set of competencies maintained by standard development organizations, so that they could be sustainable as standards evolve. For competencies related to information literacy, TICC found a very good fit with existing higher education information literacy standards of the American Library Association. The standards have been modified for nursing (Appendix 2). TICC recommended adopting the standards so that by 2011 all practicing nurses and graduating nursing students would have command of five critical abilities:

- determining the nature and extent of information needed
- accessing needed information effectively and efficiently

- evaluating information and its sources critically and incorporating selected information into one's knowledge base and value system
- using information effectively to accomplish a specific purpose, individually or as a member of a group
- evaluating outcomes of the use of information

CONCEPTUAL FRAMEWORK

An adapted version of the TIGER Nursing Informatics Competencies Model was used as the conceptual framework for this study. The conceptual framework (Figure 1) explains the major constructs of this study and includes background and personal factors found in the course of the literature review.

The conceptual framework was adapted from the TIGER model to include the influence of background and personal factors. The background factors considered are Internet and library access and use, education, years of nursing experience, age, role, and gender. The personal factors considered include reliance on browsing the Internet, experience in accessing information, and self-perceived abilities. Each of the personal and background factors was measured in the study.

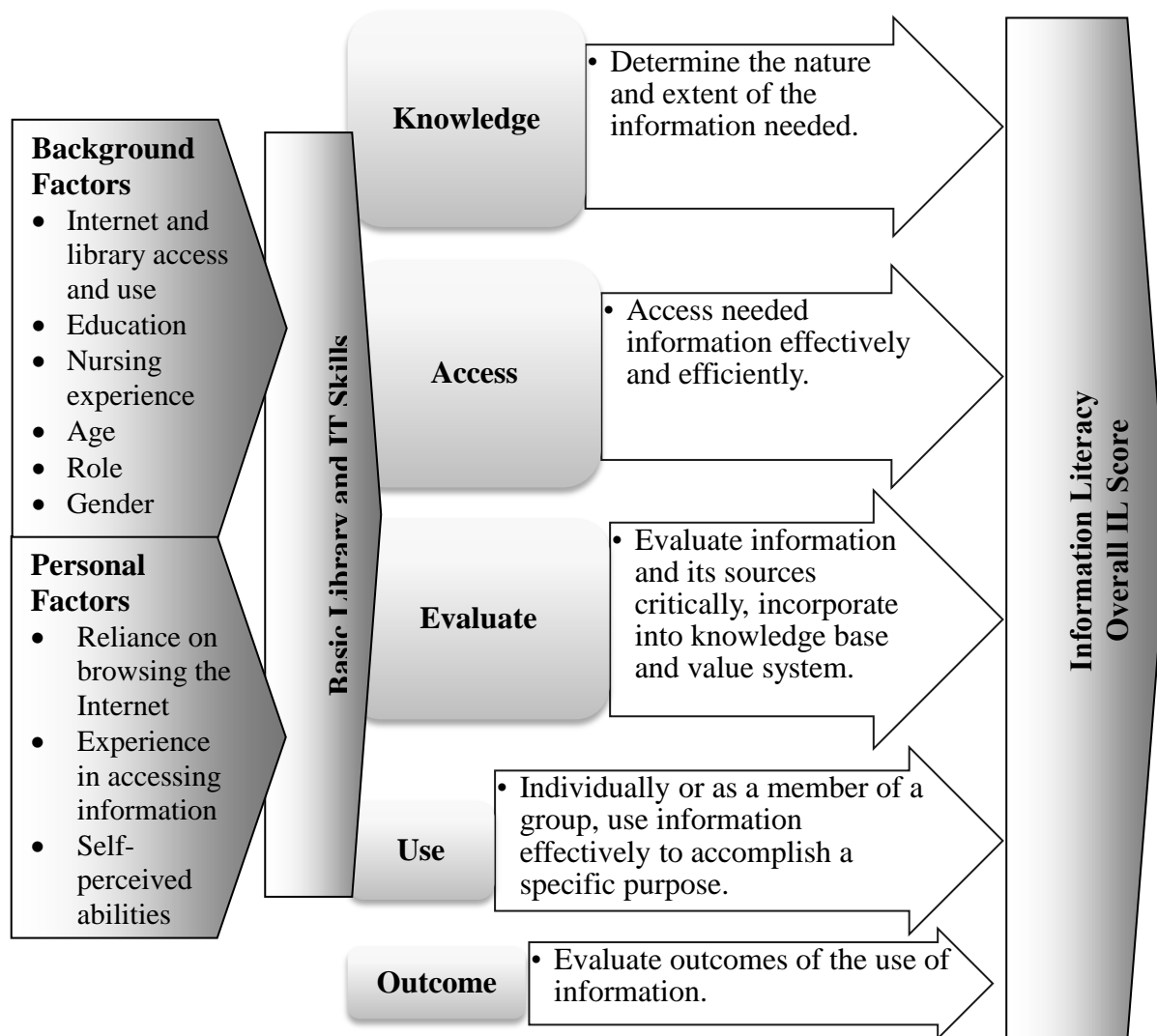
The next construct in the model addresses basic library and IT skills. Library skills were measured by means of several items in the RRSA-Nurse, and IT skills were measured indirectly based on participants' experience in accessing the RRSA-Nurse, which is an electronic survey accessible by means of the Internet. Five competencies were addressed as outcome variables in accessing health information, evaluating health information, and demonstrating overall information literacy: knowledge, access, evaluation, use, and outcome. Knowledge, access, and evaluation were explored in more depth than were use and outcome, as indicated in the model by the size of each shaded

box. Each competency is defined and is associated with performance indicators that are not included in the model, but that are assumed to be part of the model. Further details of the performance indicators are contained in Appendix 2.

SUMMARY

Critical review of literature related to health care information and the Internet, to information literacy in nursing practice, and to education and background and personal factors has revealed that studies related to nurses' information literacy have been largely descriptive and largely focused on self-perception of information literacy abilities. No studies were found that focused on measuring the information literacy competencies of nurses. The present study, therefore, included quantitative methods discussed in chapter 3, which were based on the conceptual framework to guide measuring the information literacy competencies of nurses.

Figure 1: Conceptual Framework. Adapted from TIGER Nursing Informatics Competencies Model



Chapter 3: Methodology

This chapter includes discussion of the research design, study setting, research participants, instrumentation, and procedures used for data collection and data analysis.

RESEARCH DESIGN

For the present cross-sectional, descriptive, correlational study using Internet methods, the Research Readiness Self-Assessment Nurse (RRSA-Nurse) was used. The online instrument features true/false and multiple-choice items as well as interactive exercises, designed to measure participants' ability to access and evaluate information, reliance on browsing the Internet, library and research experience, and self-perception of abilities. The instrument includes items to obtain data concerning participants' gender, age, highest level of nursing education, time since highest nursing degree, credits toward next nursing degree, primary professional role, access to the Internet, participation in education related to accessing and evaluating information, and current employment status. The purpose of the study was to examine the information literacy competencies of registered nurses working in magnet hospitals.

STUDY SETTING

The study was conducted in four non-profit, magnet hospitals, within a single healthcare organization, in a large Texas city. Hospital one is located in a suburban area on a major state highway. With 195 registered nurses, it provides a broad range of complex medical-surgical services. Hospital two is located in the urban core downtown, employing 898 registered nurses; it is the largest acute care hospital in the city. Hospital three is located off of a major interstate highway and is the only major trauma facility in the area. With 563 registered nurses, it is also the training hospital for the medical

residents of a large university. Hospital four is the only pediatric hospital in the region, serving a 46-county area with 438 registered nurses. All four hospitals obtained magnet status in 2002 and were re-designated in 2009.

There are 7632 RNs residing in the county that incorporates the four hospitals in the study (Texas Board of Nursing, 2009). The study sites include approximately 20% of the RNs employed in the county (Texas Board of Nursing, 2009). The hospitals do not provide data on their staff mix; however, characteristics of the nursing workforce located in the county are documented. Of the RNs in the county, 63% are employed full time in nursing while 15% are employed part-time (Texas Board of Nursing, 2009). The remaining 22% of RNs are not employed in nursing or are unemployed (Texas Board of Nursing, 2009). Ten percent of RNs hold a diploma in nursing; 31% hold an associate's degree in nursing; and 42% hold a bachelor's degree in nursing (Texas Board of Nursing, 2009). Fifty-three percent of RNs are employed in an inpatient hospital setting (Texas Board of Nursing, 2009).

The hospitals do not have data available on the ethnic diversity of the RNs at each of the four hospitals in the study. However, the latest annual report from the umbrella organization of the four hospitals included data on the ethnic diversity of the 3199 RNs of the entire organization: 8% were Asian-American, 4% were African-American, 10% were Hispanic/Latino, and 78% were Caucasian (Seton Family of Hospitals, 2009b). There were 2,862 females and 337 males (Seton Family of Hospitals, 2010). By generation, 2% were Veterans (66+ years old); 41% were Baby Boomers (51-65 years old); 44% were Gen Xers (31-50 years old); and 13% were Millennials (18-30 years old) (Seton Family of Hospitals, 2009b).

The four hospitals are component members of a single healthcare organization that serves a population of 1.6 million over 4,000 square miles. The largest private

employer in the region, the healthcare organization has over 10,000 employees at 24 medical centers, hospitals, and clinics. The organization has served the region for over 107 years (Seton Family of Hospitals, 2009a).

The region, home of one of the country's leading high-technology cities, includes several large computer and semiconductor companies with major operations in the area. The region's major city was one of the most wired cities in the nation at the time of the study (Woyke, 2009), and over 39% of the labor pool was college-educated (Austin Chamber of Commerce, 2009). Because of such demographic features, the region provided an appropriate setting for conducting the study, though these distinctive features also limit the generalizability of the findings.

STUDY PARTICIPANTS

Inclusion Criteria

Potential study participants were registered nurses who met three criteria: (a) they were employed full time, part-time, or as needed (also called PRN or per diem) at any of the four magnet hospitals; (b) they could read and write English on a computer; and (c) they had access to the Internet at home or at work. A convenience sampling method using e-mail notification was chosen to recruit participants.

Sample size

To address the research questions using correlation and regression statistical methods, the conceptual framework included 10 independent variables. Power analysis required performing calculations using the GPower program (Faul, Erdfelder, Lang, & Buchner, 2007). When the sample size is 120, the multiple linear regression test of $R^2=0$ ($\alpha=0.05$) for 10 normally distributed covariates will have 80% power to detect an R^2

of 0.15, which is considered a medium effect size. For the present study, the total number of participants who completed the RRSA-Nurse was 121.

INSTRUMENTATION

The RRSA-Nurse was used for data collection. It was evaluated for reliability during the course of the study, contributing information for the first time about the reliability of the instrument when used with a nursing sample. Before discussion of procedures and results in the final section of this chapter, discussion follows concerning the RRSA-Nurse instrument.

Research Readiness Self-Assessment (RRSA)-Nurse

The Research Readiness Self-Assessment—Nurse (RRSA-Nurse) was used to obtain objective measures of information literacy competencies of registered nurses. In addition to multiple-choice and true/false items, the RRSA-Nurse tool includes subjective items addressing three areas: (a) self-perceived ability to access and evaluate health information, (b) reliance on browsing the Internet for health information (versus libraries), and (c) library and research experience in accessing health information. The RRSA-Nurse also serves as an intervention tool for building competencies by providing narrative feedback based on performance and an explanation of factors that may contribute to performance regarded as low, average, or high. Participants who complete the RRSA-Nurse have the option to request additional materials for self-directed learning, such as an explanation of the differences between scholarly and non-scholarly resources. The links to such additional materials are sent by e-mail to a participant upon request.

The interactive, online Research Readiness Self-Assessment (RRSA), which is based on the Association of College and Research Libraries Information Literacy Competency Standards for Higher Education, was developed to assist librarians and

faculty from various disciplines in their efforts to equip college students with the skills and knowledge necessary to become effective, independent users of secondary-source information from digital sources (Ivanitskaya, 2009). Individualized feedback is provided, based on responses to true/false and multiple-choice items, performance on problem-based exercises, and self-reports.

There are three forms of the RRSA: an interdisciplinary version (RRSA-Library), a health professions version (RRSA-Health) for students in health-related disciplines, and an eHealth version, for health information consumers. A unique version was assembled for the purposes of this investigation, with items included from all three standard versions. It is important to note that the RRSA does not measure higher order skills that characterize experienced researchers, such as designing clinical trials. The version used for this study is referred to as the RRSA-Nurse, and the other versions are referred to as RRSA.

The RRSA serves both an instrument that measures respondents' information literacy competencies and also as an intervention tool for building those competencies. Feedback provided to participants directs them to resources for self-study to help them become better informed about "new media, information quality indicators, [and] the value of pre-reviewed or peer-reviewed resources...." (Ivanitskaya, 2009, What is RRSA and why was it created? section, para. 2). A National Institutes of Health reviewer described the RRSA as "a useful innovation" with which "not only individuals' actual competence, but also perceived competence, is measured, so that those with a mis-match between the two can be identified and mentored" (Ivanitskaya, 2009, What is RRSA and why was it created? section, para. 2). The reviewer also commented, "The instrument itself contains valuable feedback mechanisms to help those taking the assessment to

improve their skills, an innovative feature” (Ivanitskaya, 2009, What is RRSA and why was it created? section, para. 2).

Evidence of content validity for the RRSA was obtained by means of multiple rounds of evaluation by subject matter experts (SMEs) of RRSA content, followed by revisions based on their feedback. Nomological validity evidence has shown statistically significant correlation between GPA and RRSA performance ($r = 0.34$, $p < .0001$, $n = 1666$). Although GPA was not measured in the present study, other indicators of education were obtained, including years since last nursing degree and number of credit hours toward next nursing degree. Concurrent validity evidence suggests that achieving a perfect score on the RRSA is extremely difficult. There is a relationship between educational experience and performance on the RRSA: librarians have the highest scores (Ivanitskaya, 2011). The developers of the RRSA have received a grant through the NIH to complete a comprehensive validation study.

A reliability measure for the RRSA is based on internal consistency for a diverse sample of 1666 students (undergraduate and graduate): for all 52 multiple-choice and true/false items, Cronbach’s alpha [KR20] = 0.782; for 4 self-perceived ability items, Cronbach’s alpha = 0.795; for 5 items with a 10-point scale addressing reliance on browsing the Internet for health information, Cronbach’s alpha = 0.807; and for the 17 items addressing library and research experience, Cronbach’s alpha = 0.679 (Ivanitskaya, 2011).

The RRSA can be adapted to the individual needs of various educational programs. Adaptations can include instructions to the participants, text of individual items, detailed feedback, links to additional resources, and disclaimers. RRSA developers provide coaching and training to ensure that changes to the RRSA do not negatively impact its reliability and validity. Administration of the RRSA to partner institutions is

supported through grants, partner donations, and volunteer efforts by RRSA developers. The RRSA was made available to this investigator at a nominal cost for the purposes of this study.

Threats to internal reliability are most often associated with experimental and quasi-experimental research; however, threats to internal and external validity should be considered in the context of this study. One threat is that participants may grow fatigued while taking the survey, altering their response pattern. This threat was reduced by allowing the participants to pause and finish the survey later by using their personal identification number (PIN) to log back onto the survey. Another threat is that participants may respond differently by the end of the survey because they have surmised what was being asked and they wish to accommodate or thwart the investigator. This threat was reduced by designing the RRSA-Nurse to be primarily a competency-based assessment. A major threat to external validity for the present study is the inability to generalize beyond magnet hospitals. This threat was addressed by including four hospitals in the study to increase heterogeneity, though the ability to generalize remains limited.

One principal strength of the RRSA-Nurse is that it tests skills and knowledge rather than relying only on self-report as previous information literacy studies within nursing have. However, because the RRSA-Nurse was an online instrument, potential participants with limited or no computer literacy skills, Internet access, or an e-mail address were unable to complete the assessment. This may have contributed bias to the final results.

Outcome variables

Discussion follows of the present study's three outcome variables: accessing health information, evaluating health information, and overall information literacy.

Accessing health information requires a variety of competencies: the ability to conduct basic and advanced information searches; application of Boolean operators (*and*, *or*, *not*) to limit searches; the ability to differentiate among scholarly documents, authoritative sources, periodicals, and primary sources from other types of documents and sources; and familiarity with specialized terminology, such as *abstract* and *bibliography*.

Evaluating health information requires one principal competency: the ability to compare and evaluate the quality and credibility of scholarly documents, authoritative sources, periodicals, and primary sources from other types of documents and sources found in electronic sources or on Internet web sites.

Overall information literacy comprises the integration of the competencies for accessing health information and evaluating health information.

The RRSA-Nurse instrument provided the basis for operational definitions of the outcome variables. For the variable *accessing health information*, subscale scores range from 0 to 30 based on responses to 12 multiple-choice and true/false items, indicating a participant's ability to conduct basic and advanced information searches (Ivanitskaya et al., 2006). Details about item scoring and further description of the items are included in Appendix 3.

For the variable *evaluating health information*, subscale scores range from 0 to 33 based on responses to 11 multiple choice and true/false items. Details about item scoring and further description of the items are included in Appendix 4.

An overall *information literacy competency* score was computed by summing the scores for accessing health information and evaluating health information. The maximum achievable scores were 30 points for accessing health information and 33 points for evaluating health information.

Predictor variables

The RRSA-Nurse instrument provided data concerning participant variables in two areas. Personal factors were addressed by 5 items concerning reliance on browsing the Internet for health information, 47 items concerning library and research experience, and 4 items concerning self-perceived ability to access and evaluate health information. See Appendix 5 for further details about personal factors data collection and analysis. Background factors were addressed by 18 items concerning age, gender, position (administration, clinical practice, education, other), education (highest level of earned nursing education, number of credits toward next nursing degree, time since last for-credit class), access to the Internet, type of access to the Internet, attendance at workshops/conferences/programs, nursing research fellowship participation, work status, and access to librarians and library Websites. See Appendix 6 for further details about background factors data collection and analysis.

DATA COLLECTION

A research Website for the present study was hosted from a server at a Midwestern university where the developers of the RRSA instrument were located.

Approval and support for the present study were received from the nursing leadership at the participating hospitals (Appendix 7) and from the office of research administration for the multisite hospital system (Appendix 8). The consent to participate document (Appendix 9) was sent by e-mail to all eligible participants by means of the

multisite hospital Web-based e-mail application. The consent document included a hyperlink to a Website for self-enrollment in the research study, where participants could access the enrollment keys necessary to log onto the online assessment.

The RRSA-Nurse was self-administered and self-reported, with participation in the study voluntary. Upon visiting the self-enrollment Web site, participants entered their name, e-mail address, and unique enrollment key designating their participating hospital. The participant then received a unique PIN and a hyperlink to the RRSA-Nurse instrument by means of an automatically generated e-mail message. Participants accessed the RRSA-Nurse using the hyperlink and entered their PIN. The completion time for the RRSA-Nurse was approximately 35 minutes, and the PIN allowed participants to submit an incomplete RRSA-Nurse, with an option to complete omitted items later. The RRSA-Nurse was available online for six weeks. After each participant completed the RRSA-Nurse, results were stored on a server at the Midwestern university.

Incentive to participate was provided by a drawing for one of three \$50 Amazon.com gift cards. The drawing was not linked to RRSA-Nurse results. To be eligible, participants were prompted to enter their name and phone number.

PROTECTION OF HUMAN RIGHTS

Informed consent

The present study was approved by the Institutional Review Board of the University of Texas at Austin and by the Clinical Research Steering Committee of the Seton Family of Hospitals. An informed consent agreement was provided in the e-mail recruitment message sent to potential participants (Appendix 9). Potential participants could review the title of the study and information about the principal investigator, the purpose of the study, inclusion criteria for participants, possible discomforts and

inconveniences, potential benefits and risks, confidentiality, anonymity, contribution to the study, and their right to withdraw from the study at any time. Potential participants indicated their consent to participate by clicking on the hyperlink to the self-enrollment site for the study.

Protections of Confidentiality

Participants in the study were not anonymous; however, RRSA-Nurse results were confidential. To further protect the privacy of respondents, a separate, signed consent form was not used. Data analysis required only unique PINs as identifiers to blind the real identity of participants. Also, only aggregate findings for groups were reported; no individual's data could be identified.

To ensure confidentiality, primary RRSA-Nurse data were stored on a secure server, with access restricted by means of identification of a unique Internet protocol (IP) address and password. Only the programmer and the principal investigator had database access, from computers with specific and stable IP addresses. Database access was granted for one hour, after which it was necessary to re-enter the username and password to resume access to the data. When the data were downloaded into SPSS files for statistical analyses, the data files were sanitized. No personal information appeared in the final file, and only the unique PIN was used to identify individual cases. The computers used to access data were located in private offices, which were locked at night and on weekends and which required a password for access.

DATA ANALYSIS

Quantitative data from the RRSA-Nurse were analyzed using the Statistical Package for the Social Sciences (PASW for Windows, version 18.0). Descriptive statistics were generated to characterize information from the sample of nurses, including

data concerning frequency, percentage, and mean with standard deviation and range. Cronbach's alpha or Kuder-Richardson 20 (KR20) were computed to determine the reliability of combining questions. Before data analysis, the assumptions necessary for correlation and regression were checked, such as normality, linearity, independence, and homoscedasticity. The data analysis procedures for each research question are described below.

Research questions 1, 2, and 3: These questions address the proficiency of nurses' in accessing and evaluating health information. Descriptive statistics were generated, including mean, range, and standard deviation, for the subscale scores for the variables *accessing health information*, *evaluating health information*, and *overall information literacy*.

Research question 4: This question addresses nurses' self-perceived ability to research health topics, judge the quality of health information, find information on a specific health topic, and perceive their present skill level in researching health topics. Descriptive statistics including mean, range, and standard deviation were generated for four items using an electronic visual analog scale to yield scores for self-perceived ability.

Research question 5: This question addresses the degree to which nurses *rely on browsing the Internet* for health information. Descriptive statistics including mean, range, and standard deviation were generated for five items using an electronic visual analog scale to yield scores for reliance on browsing the Internet for health information.

Research question 6: This question addresses nurses' experience in searching for health information. Descriptive statistics including mean, range, and standard deviation were generated for five items combined to create a library and research experience score.

Research question 7: This question addresses the relationship between background factors, accessing health information, evaluating health information, overall information literacy score, self-perceived ability, reliance on browsing the Internet, and library and research experience. Bivariate correlations were generated to examine the relationships among these variables.

Research question 8: This question addresses possible predictors of nurses' ability to access health information, nurses' ability to evaluate health information, and overall information literacy. Stepwise multiple regressions were used to examine the relationships between dependent and independent variables. Stepwise multiple regression was chosen to evaluate predictors in this study because it was an exploratory study. Stepwise multiple regression is considered controversial because variables are entered into the regression equation based on statistical rather than theoretical criteria but it is considered best suited to exploratory work (Polit, 2010). Assumptions necessary for using multiple regression techniques were checked, including normality, independence, multicollinearity, and homoscedasticity.

PILOT STUDY

Based on the findings of a pilot study, minor changes were made to the subsequent major study. The purpose of the pilot study was to address potential issues presented by Internet-based research, such as technical issues (e.g. broken hyperlinks).

Five nurses from the four magnet hospitals were recruited from the researcher's personal network, based on three criteria: (a) they worked at one of the four magnet hospitals; (b) they could read and write English on a computer; and (c) they had access to the Internet. All participants in the pilot study were volunteers who received a 25-dollar Amazon gift card for their participation.

First, the Web site for the RRSA-Nurse was set up and tested. Next, the participants received invitations by e-mail to complete the consent form and use a hyperlink to access the RRSA-Nurse instrument. The participants completed all items on the instrument. One participant sent the researcher an e-mail about three problems: one item contained a misspelled word; one item did not have a correct response listed; and there were issues raised about the drawing for the gift card. Changes were made, and they were reviewed using the control panel for RRSA-Nurse. The control panel provides an administrative interface to manage users, generate reports, update content, insert new items, add links to additional resources for self-directed learning, and editing narrative feedback and the text of automated e-mails messages.

SUMMARY

The present study used a cross-sectional, Internet-method design to explore information literacy competencies of registered nurses. This chapter described principal design elements including the study setting, sample size, recruitment methods, measures to protect human subjects, and data analysis. It closed with a description of the pilot study for the project. Chapter four presents the study findings.

Chapter 4: Findings

The data are presented in five sections: the first section includes a description of the sample, discussion of the assumptions, and analysis of the reliability of major study variables; the remaining four sections address data concerning each research question.

SURVEY RESULTS

Survey response

Data collection for the RRSA-Nurse instrument occurred from July 7, 2010 to August 20, 2010. The population of interest consisted of 2094 RNs at four participating magnet hospitals, all of whom received by e-mail an informed consent form with a hyperlink to the study's survey instrument and a request to complete the survey within three weeks. Four bounce-back e-mail messages were received, indicating that the potential respondent did not receive the e-mail due to an internal system error such as a system timeout, or an inbox that had reached its data limit, or an address that was unknown. After 3 weeks, 52 RNs had completed the survey.

The protocol was revised to extend the data collection period by 3 weeks and to include weekly reminders with survey completion rates by site to encourage competition to complete the survey. Such a strategy had been successful before for internal surveys at the four hospitals. The weekly e-mail reminders elicited 24 additional responses, bringing the total to 76 completed surveys. A final reminder sent in the last week of the study generated 45 more surveys, bringing the final total to 121 completed surveys, for a response rate of 6%. The responses of one participant were excluded when completion time was reported as zero, indicating an error had occurred in the electronic capture of the responses. Therefore, the results of the study are based on a sample of 120 nurses.

Several factors may have affected the response rate. First, the study immediately followed administration of a large Internet-based survey within the organization from April to May 2010. That instrument was available on the organization's intranet, which was available without a password to all nurses with access to a computer in the clinical setting. The present study did not use the organization intranet, limiting access to the survey to those with e-mail access outside of work hours and to particularly savvy users who could have accessed the study link regardless. Even though the survey was not on the intranet particularly savvy users would know how to access the link at home by perhaps copying and pasting it in an email to themselves and completing it on any computer with Internet access. So, not having access to the Internet at work would not have stopped them from completing the survey. In addition, the study survey was deployed during the summer when the census of many of the hospitals was at its lowest, making fewer nurses available to participate in research studies. Finally, only some nurses at the study sites have unlimited access to the Internet through their job: typically, those who are higher on the career ladder and therefore were more likely to respond to the survey.

Demographic Characteristics of the Sample

Several demographic characteristics of the nurse sample were obtained (Table 3), including gender, age, education, time since highest nursing degree, credits toward next nursing degree, highest earned nursing education, and primary professional role.

For the 120 nurses, the mean age was 43 years (SD=10.8) with a range from 24 to 64. A majority of the participants were in the 45-64 year category. Most of the participants were female (89.2%). Fifty-two percent of the nurses had earned their last nursing degree more than 10 years earlier, and sixty percent had no credits toward their

next nursing degree. Half of the participants had earned a bachelor's degree in nursing (50%). Compared to the RNs residing in the county that incorporates the four hospitals in the study, the participants in this study had a higher percentage of bachelor's degrees in nursing; 42% versus 50%. Seventy-three percent of participants considered their primary professional role to be clinical practice and 29% of respondents requested additional materials for self-directed learning in the form of hyperlinks to selected Web sites.

Table 3: Demographic Data of the RRSA-Nurse Participants (N=120)

	N (%)*		N (%)*
Gender		Professional role	
Male	13(10.8)	Administration	13(10.8)
Female	107(89.2)	Clinical practice	87(72.5)
Education		Education	12(10.0)
Diploma	5(4.2)	Other	8(6.7)
Associate	33(27.5)	Age	
Bachelor	60(50.0)	30 or less	17(14.2)
Master	21(17.5)	30-44	47(39.2)
Doctoral	1(0.8)	45-64	56(46.7)
Credits toward next nursing degree		Time since highest nursing degree	
None	71(59.2)	<1 year	6(5.0)
1-9	11(9.2)	1-2 yr	12(10.0)
10-24	8(6.7)	2-3 yr	10(8.3)
25-40	11(9.2)	3-5 yr	11(9.2)

41-70	10(8.3)	5-10 yr	19(15.8)
71-100	2(1.7)	>10 yrs	62(51.7)
101 or more	7(5.8)		

*Percentages may not add to 100% due to rounding.

Reliability Analyses and Computation of Outcome Variables

Internal consistency estimates of reliability were computed for each outcome variable.

Ability to access information (Access)

Of the 30 items in this scale (Appendix 3), two were excluded from the analysis due to zero variance. Item 3d (*Journal of the American Medical Association*) had zero variance because it was marked by all participants and item 6g (*none of the above*) had zero variance because it was marked by no participants. For the 28 items included in the modified *ability to access information* scale, KR20 was 0.628. (See Appendix 10 for detailed item-total statistics.) The modified *ability to access information* scale was computed by summing the points for the remaining 28 items. The minimum score that could be achieved was 1. The maximum score that could be achieved by a participant for the modified *accessing information* scale was 28 points.

Ability to evaluate information (Evaluate)

For the 31 items included in the *evaluating health information* scale, KR20 was 0.618. (See Appendix 11 for detailed item-total statistics.) The ability to evaluate information variable was computed by summing the points for the 31 items. The minimum score that could be achieved was 1. The maximum score that could be achieved for the evaluating health information scale was 31 points.

Overall information literacy

The overall information literacy score was calculated by adding the scores for (a) 28 items that measured the *ability to access information* scale and (b) 31 items that measured the *ability to evaluate information* scale. The KR20 for the 59 items in the overall information literacy score was 0.73. The minimum overall score that could be achieved was 1. The maximum overall score that could be achieved was 59.

According to Streiner and Norman (2003), internal consistency should exceed 0.8. Although, the KR20 values for the two subscales were below 0.8, the overall KR20 for the overall information literacy variable was 0.73. Therefore, the stability for the subscales was acceptable.

Reliability Analysis and Computation of Personal Factor Variables

Internal consistency estimate of reliability were computed for each personal factor variable.

Self-perceived abilities (Self-perception)

Four items were included in the *self-perception* scale. The Cronbach's alpha was 0.90 (See Appendix 5 for detailed items). The minimum score was zero. The maximum score that could be achieved was 40. A high score indicates a high belief in one's own ability to access and evaluate health information.

Reliance on browsing the Internet (Reliance on browsing)

For the 5 items included in the *reliance on browsing* scale, Cronbach's alpha was 0.68. (See Appendix 5 for detailed items.) The minimum score was zero. The maximum score that could be achieved by a participant for the reliance on browsing scale was 50 points. A lower score indicates less reliance on browsing using the Internet using general

search engines to search for health information (versus libraries), while a higher score indicates a stronger reliance on Internet browsing for health information.

Library and research experience in accessing information (Experience)

Forty-seven items were included in the *library and research experience* scale (See Appendix 5 for detailed items and scoring.) Sixteen items were excluded from the analysis due to zero variance: 1c, 1d, 1i, 2g, 2h, 2j, 3k, 5h (*none of the above*), 4a (*download*), 4c (*advanced search*), 4d (*preference setting*), 4e (*refresh or reload*), 4f (*MP3*), 4g (*newsgroup*), and 4h (*PDF*). Cronbach's alpha for the remaining 31 items in the modified *library and research experience* scale was 0.78. The minimum score was 1. The maximum score that could be achieved was 42. A high score indicates more experience in accessing information.

Assumption Check

Several assumptions for multiple regression were checked, including normality and independence, multicollinearity and homoscedacity (Munro, 2005). The continuous outcome variables were accessing health information, evaluating health information, and overall information literacy. The continuous predictor variables were age, self-perception of abilities, reliance on browsing the Internet for health information, and library and research experience. The assumption of normality was tested by examining the level of skewness and kurtosis of the distribution of the frequency or descriptive data for the continuous outcome and predictor variables. Also, the data were graphed using a histogram and Q-Q plot. Categorical variables—including role, time since highest nursing degree, credits to next nursing degree, Internet use, library Web site use, library contacts, and library use—were collapsed into two categories for analysis. Other variables—including gender, participating in the Nursing Research Fellowship, and

previous education—related to accessing and evaluating health information using the Internet were already collapsed into two categories. Education was collapsed into 3 categories: Graduate prepared, BSN, and ADN/Diploma. The level of skewness and kurtosis were checked and showed departure from symmetry. However, the histograms and Q-Q plots did not indicate a violation of normality.

The assumption of independence was checked by examining Durbin-Watson statistics. For the accessing information variable, the assumption of independence was met according to the Durbin-Watson statistic of 1.77, which was within the acceptable range of 1.5-2.5 (Norusis, 2005). For the evaluating health information variable, the Durbin-Watson statistic was 1.69. For the overall information literacy variable, the Durbin-Watson statistic was 1.65.

The assumption of multicollinearity was checked by examining the level of tolerance and the variance inflation factor (VIF). For accessing health information, the level of tolerance was about 0.82 and the VIF was 1.23. For evaluating health information, the level of tolerance was around 0.82 and the VIF was 1.22. The acceptable range for the level of tolerance should be between 0.00 and 1.00, with higher values being more desirable (Polit, 2010), and the VIF should be less than 10 (Munro, 2005; Norusis, 2005). Therefore, multicollinearity was not considered a concern.

The homoscedasticity was checked by examining the plots of the studentized residuals and predicted values for the models of accessing health information, evaluating health information, and overall information literacy. The plots showed that the residuals were randomly scattered along a horizontal line through zero, which indicated that the assumption of homoscedasticity was met.

RESEARCH QUESTIONS ONE, TWO, AND THREE

Descriptive statistics including mean and standard deviation were used to answer research questions one, two, and three:

1. What is the ability of nurses to access health information?
2. What is the ability of nurses to evaluate health information?
3. What is the overall information literacy of nurses in relation to health information?

The mean and standard deviation of the modified accessing information sub score were 21.58 (on the scale of 1-28) and 3.16. The mean and standard deviation of the evaluating health information sub score was 26.42 (on the scale of 1-31) and 2.87. The mean and standard deviation of overall information literacy was 47.99 (on the scale of 1-59) and 5.02. The results are shown in Table 4. The distributions of all three variables showed a substantial negative skew.

Table 4: Descriptive Statistics for Accessing and Evaluating Health Information and Overall Information Literacy Scores

Variables	n	Range	Mean	SD	Min	Max
Accessing-modified	120	10-27	21.58	3.16	10.00	27.00
Evaluating	119	16-31	26.42	2.87	16.00	31.00
Overall IL	119	31-58	47.99	5.02	31.00	58.00

RESEARCH QUESTIONS FOUR, FIVE, AND SIX

Descriptive statistics including mean and standard deviation were used to answer research questions four, five and six:

4. What is the self-perceived ability of nurses to access and evaluate health information?
5. What is nurses' reliance on browsing the Internet for health information?
6. What is the library and research experience of nurses in accessing health information?

Additional items related to nurses' experience were also used to answer research question six, and they are also presented.

The mean and standard deviation for self-perceived ability to access and evaluate electronic health information were 27.91 and 6.98. The mean and standard deviation for nurses' reliance on browsing the Internet for health information were 14.74 and 8.42. The mean and standard deviation for nurses' experience in accessing health information were 18.52 and 7.87. The results are summarized in Table 5. The distribution for self-perception showed a severe negative skew; the distribution for reliance on browsing the Internet showed a severe positive skew; and the distribution for experience was symmetrical.

Table 5: Descriptive Statistics of Personal Factor Variables

Variable	n	Range	M	SD	Min	Max
Self-perception	120	6.28-39.60	27.91	6.98	6.28	39.60
Reliance on browsing	120	0-37.30	14.74	8.42	0.00	37.30
Experience-modified	120	1-38	18.52	7.87	1.00	38.00

Seven items were used to describe nurses' Internet and library use and are summarized in Tables 6-12. A majority of the participants had access to the Internet at home (99.2%) and at work (98.3%). Tables 6 and 7 show details of Internet access.

Eighty-six percent of participants reported using the Internet every day over the past year. Tables 8-10 show details related to library use, library Web site access, and contacts with library staff members. Forty-eight percent accessed a library Web site less than once a month; 62% used a library less than once a month during the past year; and 36% reported having no contacts with library staff members during the past year. In Table 11 shows details concerning individuals with Internet access at work. Fifty-three percent of participants indicated that all staff nurses had access to the Internet at work. Table 12 shows details concerning education related to accessing information. Fourteen participants indicated participation in the Nursing Research Fellowship (12%), and 22% reported attending conferences, workshops, or programs associated with the ability to find and access health information.

Table 6: Internet access

	N (%)	
Access	Yes	No
Home	119(99.2)	1(0.8)
Work	118(98.3)	2(1.7)

Table 7: Average use of Internet during the past year

	Number	Percentage
Every 2 weeks	1	1%
Once a week	2	2%
Several times a week	14	12%
Every day	103	86%

Total	120	101%
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Note. Percentages may not add to 100% due to rounding.

Table 8: Frequency of library use during the past year

	Number	Percentage
Less than once a month	74	62%
Once a month	11	9%
Every 2 weeks	6	5%
Once a week	12	10%
Several times a week	14	12%
Every day	3	3%
Total	120	101%

Note. Percentages may not add to 100% due to rounding.

Table 9: Frequency of library web site access

	Number	Percentage
Less than once a month	58	48%
Once a month	17	14%
Every 2 weeks	4	3%
Once a week	12	10%
Several times a day	24	20%

Everyday	5	4%
Total	120	100%

Note. Percentages may not add to 100% due to rounding.

Table 10: Number of contacts with library staff during the past year

	Number	Percentage
None	43	36%
1 contact	19	16%
2-3 contacts	25	21%
4-5 contacts	11	9%
6-9 contacts	11	9%
10 or more contacts	11	9%
Total	120	100%

Note. Percentages may not add to 100% due to rounding.

Table 11: Individuals with Internet access at work

	N(%)	
	Yes	No
All staff nurses	64(53.3)	56(46.7)
Advanced practice nurses	58(48.3)	62(51.7)
Nurse managers	65(54.2)	55(45.8)
All staff members	41(34.2)	79(65.8)

Nursing students	18(15.0)	102(85.0)
Do not know	23(19.2)	97(80.8)
Not applicable	2(1.7)	118(98.3)

Table 12: Education related to accessing information

	N (%)	
	Yes	No
Nursing Research Fellowship	14(11.7)	106(88.3)
Conferences, workshops, programs	26(21.7)	94(78.3)

Note. Percentages may not add to 100% due to rounding.

RESEARCH QUESTION SEVEN

Bivariate correlation was used to answer research question seven: What relationships exist between nurses' ability to access health information, nurses' ability to evaluate health information, nurses' overall information literacy, and nurses' self-perception to access and evaluate health information, nurses' reliance on browsing the Internet for health information, nurses' experience in accessing health information and background factors? Several variables were not included in the correlation analysis due to their lack of variance. Limited variance attenuates correlations. Variables excluded from the correlation were gender (89.2% were female), Internet access at home and at work (99% and 98% respectively), and average use of the Internet (daily, 86%). The modified accessing health information sub-score was used for the analyses.

The Pearson correlation coefficient was used to analyze the relationship between variables. The point-biserial correlation coefficient was used for categorical variables that

had been dichotomized or dummy coded. The categorical variables that were dichotomized and dummy coded for the analysis are shown in Table 13.

Table 13: Descriptive statistics for categorical variables dichotomized and dummy coded

Variable	Categories=Code	N(%)
Frequency of accessing library web site	Less than once a month=0	115(95.8)
	More than once a month=1	5(4.2)
Contacts with library staff during the past year	No contacts=0	43(35.8)
	1 or more contacts=1	77(64.2)
Frequency of using the library during the past year	Less than once a month=0	74(61.7)
	More than once a month=1	46(38.3)
Time since highest nursing degree	Less than 10 years=0	58(48.3)
	More than 10 years=1	62(51.7)
Credits earned toward next nursing degree	No credits=0	71(59.2)
	Some credits=1	49(40.8)
Primary professional role	Not clinical practice=0	33(27.5)
	Clinical practice=1	87(72.5)
ADN/Diploma		38(31.7)
BSN		60(50.0)
Graduate prepared		22(18.3)

Details concerning correlation coefficients are shown in Table 14. The variables significantly related to nurses' ability to access health information were nurses' ability to evaluate health information ($r = 0.39$, $p < 0.01$), nurses' reliance on browsing the Internet

($r = -0.20$, $p < 0.05$), nurses' self-perceived ability to access and evaluate health information ($r = 0.26$, $p < 0.01$), nurses' experience in accessing health information-modified ($r = 0.37$, $p < 0.01$), and library use ($r_{pb} = 0.27$, $p < 0.01$).

Nurses' reliance on browsing the Internet for health information ($r = -0.29$, $p = <0.01$) was inversely related to their ability to evaluate health information.

Variables significantly related to overall information literacy were role, either clinical or not clinical, ($r = -0.19$, $p = <0.05$), graduate prepared nursing education ($r_{pb} = 0.24$, $p < 0.01$), nurses' reliance on browsing the Internet ($r = -0.29$, $p < 0.01$), nurses' library and research experience-modified ($r = 0.23$, $p < 0.05$), contact with library staff ($r_{pb} = 0.21$, $p = <0.05$), and library use ($r_{pb} = 0.21$, $p < 0.05$). Several variables were not significantly related to nurses' overall information literacy: age, time since highest nursing degree, credits to next nursing degree, BSN nursing education, ADN/Diploma nursing education, self-perception, library Web site use, participating in the Nursing Research Fellowship, and previous education. However, participation in the Nursing Research Fellowship was related to library use and library contacts.

A significant positive relationship to role (clinical vs. nonclinical) was found for the personal variable nurses' *reliance on browsing the Internet* for health information, for which a higher score indicates a strong reliance on Internet browsing for health information ($r_{pb} = 0.25$, $p < 0.01$). Significant negative relationships were found for credits to next nursing degree (credits vs. no credits) ($r_{pb} = -0.29$, $p < 0.01$), the ability to access health information ($r = -0.20$, $p < 0.01$), and the ability to evaluate health information ($r = -0.29$, $p < 0.01$).

Nurses' self-perceived ability to access and evaluate health information was negatively correlated to role ($r_{pb} = -0.26$, $p < 0.01$). The variable was positively correlated with credits to next nursing degree ($r_{pb} = 0.21$, $p < 0.05$), graduate prepared nursing

education ($r_{pb} = 0.22$, $p < 0.05$), BSN nursing education ($r_{pb} = 0.23$, $p < 0.01$), and ability to access health information ($r = 0.26$, $p < 0.01$). Finally, nurses' library and research experience-modified was negatively correlated to role ($r_{pb} = -0.26$, $p < 0.01$) and positively correlated to credits to next nursing degree ($r_{pb} = 0.25$, $p < 0.01$), ability to access health information ($r = 0.37$, $p < 0.01$), and self-perceived ability to access and evaluate information ($r = 0.54$, $p < 0.01$).

Table 14: Correlations Between Major Variables (N=120)

Pearson's r correlations

Variable	1	2	3	4	5	6	7
1. Age							
2. Role	-0.25**						
3. Time since highest degree	0.57**	0.04					
4. Credits to next degree	0.10	-0.25**	-0.11				
5. Graduate prepared	0.09	-0.19*	-0.15	-0.04			
6. BSN	-0.12	0.06	0.10	-0.15	-0.47**		
7. ADN/Diploma	0.05	0.10	0.01	0.20*	-0.32**	-0.68**	
8. Accessing-modified	0.01	-0.14	-0.12	0.06	0.23*	-0.12	-0.07
9. Evaluating ^a	0.04	-0.18	-0.06	0.01	0.16	0.08	-0.21*
10. Reliance on browsing	-0.03	0.25**	0.12	-0.29**	-0.02	0.42	-0.31
11. Self-perception	-0.00	-0.26**	-0.13	0.21*	0.22*	0.23**	0.12
12. Experience-modified	-0.02	-0.26**	-0.13	0.25**	0.15	-0.13	0.01
13. Library website use	0.15	-0.15	0.04	0.17	-0.10	0.04	0.04

Table 14 (continued): Correlations Between Major Variables (n=120)

Variable	1	2	3	4	5	6	7
14. Library contacts	0.12	-0.23*	-0.10	0.16	0.09	-0.02	-0.05
15. Library use	0.16	-0.40**	-0.06	0.39**	0.03	-0.14	0.13
16. Nursing Research Fellowship	0.10	-0.01	0.09	0.12	0.09	0.00	0.09
17. IL education	-0.03	-0.13	-0.180*	0.10	-0.01	-0.04	-0.01
18. Overall IL ^a	0.03	-0.19*	-0.13	0.01	0.24**	-0.03	-0.17

^aN=119

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 14 (continued): Correlations Between Major Variables (N=120)

Variable	8	9	10	11	12	13	14
8. Accessing-modified							
9. Evaluating ^a	0.39**						
10. Reliance on browsing	-0.20*	-0.29**					
11. Self-perception	0.26**	-0.01	0.01				
12. Experience-modified	0.37**	-0.00	-0.17	0.54**			
13. Library web site use	-0.03	0.09	-0.05	0.17	0.10		
14. Library contacts	0.17	0.14	-0.20*	0.14	0.23*	0.07	
15. Library use	0.27**	0.07	-0.33**	0.45**	0.42**	0.18	0.23*
16. Nursing Research Fellowship	0.07	0.02	-0.17	0.08	0.14	0.05	0.22*
17. IL education	-0.01	-0.06	0.00	0.13	0.21*	0.30**	0.14
18. Overall IL ^a	0.85**	0.81**	-0.29**	0.15	0.23*	0.03	0.21*

^aN=119

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 14 (continued): Correlations Between Major Variables (N=120)

Variable	15	16	17
15. Library use			
16. Nursing Research Fellowship	0.19*		
17. IL education	0.13	0.19*	
18. Overall IL ^a	0.21*	0.06	-0.04

^aN=119

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

RESEARCH QUESTIONS EIGHT

Stepwise multiple regression analysis procedures were used to answer research question 8: What factors predict nurses' (a) ability to access health information-modified, (b) ability to evaluate health information, and (c) overall information literacy? Variables chosen for the regression model were based on the conceptual model and significant correlations. The normality of the variables was examined previously. Four variables were excluded from the multiple regression analysis due to lack of variance: gender (89% female), Internet use over the past year (daily 86%), Internet access at home and at work (99% and 98% respectively), and participation in the Nursing Research Fellowship (88% had not attended).

Predictors were entered into all equations using the stepwise method. Each time a predictor was added to the equation, a removal test was made of the least useful predictor so as Field (2005) reminds us, "the regression equation is constantly reassessed to see whether any redundant predictors can be removed" (p. 161). The predictor with the highest *t*-statistic was entered first by the computer and then one by one, predictors were entered until there were none left with *t*-statistics with significance values $<.05$ (Field 2005).

Stepwise multiple regression was used to answer the question: What factors predict nurses' ability to access health information-modified. Fourteen predictors were available for entry: age, role, time since highest nursing degree, credits to next nursing degree, graduate prepared nursing education, BSN education, ADN/Diploma education, reliance on browsing the Internet for health information, self-perception, library and research experience-modified, library Web site use, library contact, library use, and previous education related to accessing and evaluating health information on the Internet.

In model 1, library and research experience-modified accounted for 11.6% of the variability in accessing health information ($R^2 = 0.12$, adjusted $R^2 = 0.12$, $F[1,119] = 16.65$, $p < 0.001$). When graduate prepared nursing education was added, R^2 increased by 0.03 in model 2, which explained 14.6% of the variability in accessing health information-modified ($R^2 = 0.16$, adjusted $R^2 = 0.15$, $F[2,119] = 11.14$, $p < 0.001$). The results are shown in Table 15.

Table 15: Stepwise Multiple Regression of Predictors on Accessing Health Information

Model	Predictors	B	SE	β	t	R^2	Adj R^2	$R^2\Delta$
1	(Constant)	17.3	0.68		25.29	0.12	0.12	0.12
	Library and Research Experience-modified	0.14	0.03	0.35	4.08***			
2	(Constant)	17.24	0.67		25.6	0.16	0.15	0.04
	Library and Research Experience-modified	0.13	0.03	0.32	3.76***			
	Graduate prepared nursing education	1.54	0.69	0.19	2.25*			

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Stepwise multiple regression was used to answer the question: What factors predict nurses' ability to evaluate health information? The same fourteen predictors were entered.

In model 1, reliance on browsing the Internet for health information accounted for 8.5% of the variability in evaluating health information ($R^2 = 0.09$, adjusted $R^2 = 0.09$,

$F[1,118] = 11.95, p < 0.001$). When ADN/Diploma was added, R^2 increased by 0.05 in model 2, which explained 12.7% of variability in accessing health information ($R^2 = 0.14$, adjusted $R^2 = 0.13$, $F[2,118] = 9.55, p < 0.001$). The results are shown in Table 16.

Table 16: Stepwise Multiple Regression of Predictors on Evaluating Health Information

Model	Predictors	B	SE	β	T	R^2	Adj R^2	$R^2\Delta$
1	(Constant)	26.94	0.51		53.19	0.09	0.09	0.09
	Reliance on browsing	-0.10	0.03	-0.30	-3.46***			
2	(Constant)	27.39	0.52		52.26	0.14	0.13	0.05
	Reliance on browsing	-0.10	0.03	-0.31	-3.59***			
	ADN/Diploma	-1.35	0.53	-0.22	-2.57*			

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Stepwise multiple regression was used to answer the question: What factors predict nurses' overall information literacy? The same fourteen predictors used previously were available for entry. The two sub-scores—accessing health information—modified and evaluating health information—were excluded from the analysis.

In model 1, reliance on browsing the Internet for health information accounted for 9.2% of the variability in evaluating health information ($R^2 = 0.10$, adjusted $R^2 = 0.09$, $F[1,118] = 12.98, p < 0.001$). When graduate prepared nursing education was added, R^2 increased by 0.05 in model 2, which explained 13.6% of the variability in the overall information literacy score ($R^2 = 0.15$, adjusted $R^2 = 0.14$, $F[2,118] = 10.32, p < 0.001$). The results are shown in Table 17.

Table 17: Stepwise Multiple Regression of Predictors on Overall Information Literacy

Model	Predictors	B	SE	β	T	R ²	Adj R ²	R ² Δ
1	(Constant)	48.02	0.90		55.08	0.10	0.09	0.10
	Reliance on browsing	-0.18	0.05	-0.32	-3.60***			
2	(Constant)	47.45	0.88		54.10	0.15	0.14	0.05
	Reliance on browsing	-0.18	0.05	-0.31	-3.64***			
	Graduate prepared nursing education	2.86	1.08	0.23	2.65**			

*p<0.05, **p<0.01, ***p<0.001

SUMMARY

Nurses employed at magnet hospitals possessed high ability to access and evaluate health information and high overall information literacy. Their self-perception of their abilities to access and evaluate health information was high, and they exhibited low reliance on browsing the Internet for health information. Their library and research experience was moderate.

Their ability to access health information was significantly correlated with their ability to evaluate health information, their self-perception in their abilities, their library and research experience, and their library use and overall information literacy. Their reliance on browsing the Internet for health information was negatively correlated with their ability to access information. Nurses' ability to evaluate health information was significantly correlated with their overall information literacy and was negatively

correlated with their reliance on browsing the Internet for health information. Several variables were significantly correlated with overall information literacy, including, graduate prepared nursing education, ability to access health information, ability to evaluate health information, library and research experience, contact with library staff, and library use. Their reliance on browsing the Internet for health information and role were negatively correlated with overall information literacy.

Finally, significant predictors of the ability to access health information were library and research experience and graduate prepared nursing education. Significant predictors of ability to evaluate health information were reliance on browsing the Internet for health information and ADN/Diploma nursing education. The two significant predictors for overall information literacy were reliance on browsing the Internet for health information and graduate prepared nursing education.

Chapter 5: Summary, Conclusions, and Recommendations

This chapter consists of three sections. The first section presents a summary of the study, including the purpose, the research questions, the methodology, and a summation of the findings. The second section reviews the findings for each research question, suggests limitations of the findings, and presents conclusions. The third section addresses implications of the findings and offers recommendations for nursing practice, education, and research.

SUMMARY

The purpose of this descriptive, correlational study was to examine the information literacy competencies of RNs at magnet hospitals. An adapted version of the TIGER Nursing Informatics Competencies Model provided the conceptual framework for examining information literacy competencies among nurses. Using a modified version of the RRSA instrument—designated the RRSA-Nurse—RNs participated in the study by completing the assessment online, which provided an assessment of their ability to access and evaluate health information and their overall information literacy. In addition, the RRSA-Nurse also allowed examination of nurses' self-perception of their ability to access and evaluate health information, their reliance on browsing the Internet for health information, and their personal experience in accessing health information. Also examined were associations between nurses' ability to access and evaluate information, overall information literacy and their self-perceived abilities, reliance on browsing the Internet for health information, and personal experience in accessing health information. Determining inter-correlational reliability contributed to an examination of the instrument's reliability.

Eight research questions guided data collection:

1. What is the ability of nurses to access health information?
2. What is the ability of nurses to evaluate health information?
3. What is the overall information literacy competency of nurses with regard to health information?
4. What is the self-perception of nurses' ability to access and evaluate health information?
5. What is nurses' reliance on browsing the Internet for health information?
6. What are nurses' library and research experience in accessing health information?
7. What relationships exist among these six factors of information literacy?
8. What factors predict nurses' ability to (a) access health information, (b) evaluate health information, and (c) overall information literacy?

This cross-sectional correlational study was conducted using six principal descriptive variables:

- ability in accessing health information
- ability in evaluating health information
- overall information literacy
- self-perception of abilities
- reliance on browsing the Internet for health information
- experience in accessing and evaluating health information

An online instrument was available by means of the Internet to the entire population of 2094 RNs at the four participating hospitals between July 7, 2010 and August 20, 2010, with a total of 121 responding to the assessment. Because this was a descriptive correlational study, data analysis included parametric statistics. Pearson's r

was calculated to answer research question 7, and multiple stepwise regression analysis was used to answer research question 8.

DISCUSSION OF FINDINGS

Discussion of the findings for each research question includes comparisons with findings from previous studies, though literature addressing information literacy of nurses employed at hospitals is limited.

Research Questions One, Two, and Three

The first three research questions addressed nurses' ability to access and evaluate information and their overall information literacy:

- What is the ability of nurses to access health information?
- What is the ability of nurses to evaluate health information?
- What is the overall information literacy competency of nurses in relation to health information?

A major finding of the present study is that nurses who participated possessed high ability to access and evaluate health information, and their overall information literacy was high. This finding is inconsistent with previous research examining information literacy in nursing practice (Pravikoff et al., 2005; Rosenfeld et al., 2002). However, unlike the present study, the earlier studies did not measure the performance of individuals directly, relying on self-reports of ability and literacy. Therefore, direct comparison of these findings may not be appropriate. Moreover, because the response rate was low, it is possible that those most interested and skilled in information literacy responded.

Because the RRSA-Nurse was a version of an instrument previously used with college-aged participants, one explanation for the high scores in the present study is that

the assessment was not difficult enough for these participants. And because the present study was conducted in magnet hospitals where expectations are high that nurses can locate and apply information in their practice, it is reasonable to expect that these participants would possess substantial information literacy. In addition, the hospitals in the present study limit Internet access to nurses who are on the professional career ladder, so it is reasonable to suggest that nurses who accessed and completed the RRSA-Nurse may have been highly motivated to do so. Their Internet access may have afforded them greater experience that was reflected in higher scores. The present study produced no data on the professional career ladder level of the nurses who completed the RRSA-Nurse, so this is a factor that may merit consideration in future studies.

Research Questions Four, Five, and Six

The next three research questions addressed nurses' perceptions of their abilities and their beliefs and experience:

- What is the self-perception of nurses' abilities to access and evaluate health information?
- What is nurses' reliance on browsing the Internet for health information?
- What are nurses' library and research experience in accessing health information?

Nurses' self-perception in their abilities to access and evaluate health information was high, suggesting that most nurses had great confidence in their abilities to access and evaluate health information. This finding is consistent with that of other studies that have measured the self-perception of information literacy abilities of nurses (Payton, 2003; Ragneskog & Gerdner, 2006; Pravikoff et al., 2005).

Nurses' reliance on browsing the Internet for health information was low, which indicates that a majority of the nurses did not rely solely on the Internet for health

information. This finding is not consistent with findings from other studies, such as one by Morris-Docker, Tod, Harrison, Wolstenholme, and Black (2004) who found that many nurses relied on a general search engine (e.g., Google) when searching for online health information. The best explanation for the finding of the present study is that nurses rely on colleagues rather than on the Internet for health information, an explanation supported by several recent studies (Dee & Stanley, 2005; Kosteniuk et al., 2006; Pravikoff et al., 2005; Secco et al., 2006; Winter, 2007).

Nurses' library and research experience was low, a finding consistent with previous research (Pravikoff et al., 2005; Kosteniuk et al., 2006). Therefore, nurses in this study had a low reliance on browsing the Internet for health information but they also had low library and research experience. These findings may provide additional evidence supporting the explanation that nurses value interpersonal methods of obtaining health information or perhaps there are other sources or methods nurse prefer to obtain health information not captured in this study which warrants further investigation.

Research Question Seven

The seventh research questions addressed relationships among nurses' abilities, perceptions, and beliefs:

- What relationships exist between background factors and the six factors identified in the previous research questions: nurses' ability to access health information, nurses' ability to evaluate health information, nurses' overall information literacy, nurses' self-perception to access and evaluate health information, nurses' reliance on browsing the Internet for health information, and nurses' experience in accessing health information?

Calculations of Pearson's r were performed to address relationships between the outcome variables and selected background factors.

A moderate relationship was indicated between ability to access health information and ability to evaluate health information, a finding consistent with the conceptual model guiding the present study—and an expected finding. Nurses' reliance on browsing the Internet for health information was negatively related to the ability to access health information, a finding that was expected in light of previous research (Secco et al., 2006; Pravikoff et al., 2005). This finding also supports the notion that nurses rely more on colleagues for information to do their work than on the Internet. There were modest relationships between library use and three variables: ability to access health information, nurses' self-perceived ability to access and evaluate health information, and nurses' experience in accessing health information.

Nurses' reliance on browsing the Internet for health information was negatively related to the ability to evaluate health information, a finding that was expected and consistent with previous findings (Secco et al., 2006; Pravikoff et al., 2005). Moderately correlated with overall information literacy were graduate prepared nursing education, nurses' library and research experience, contact with library staff, and library use. Role was negatively correlated with overall information literacy, and nurses' reliance on using the Internet exclusively for health information was also negatively correlated with overall information literacy. For the variable nurses' reliance on browsing the Internet for health information, a lower score indicated less reliance, and the variable was moderately correlated with role.

Nurses' self-perceived ability to access and evaluate health information was negatively correlated to role. It was moderately correlated with credits to next nursing degree, graduate prepared nursing education, and BSN education, which is consistent

with findings from previous studies (Ivanitskaya et al., 2006) and suggests that self-perception of information literacy skills increases with education. Nurses' library and research experience was negatively correlated with role and moderately correlated with credits to next nursing degree.

Research Question Eight

The eighth research questions addressed predictor variables:

- What factors predict nurses' (a) ability to access health information, (b) ability to evaluate health information, and (c) overall information literacy?

Stepwise multiple regressions were used to analyze this question. Significant predictors of nurses' ability to access health information were library and research experience-modified and graduate prepared nursing education. This finding is consistent with findings by Kosteniuk and colleagues (2006) that those who had access to higher education were more likely to use the Internet and the library as information sources.

Reliance on browsing the Internet for health information and ADN/Diploma nursing education were significant predictors of evaluating health information ability. Nurses who did not rely exclusively on the Internet for health information were more likely to obtain a higher score on the evaluating health information scale. Nurses with less education were less likely to obtain a high score on the evaluating health information scale, a finding that is consistent with findings from previous research revealing GPA has a significant correlation with RRSA performance ($r=0.34$, $p<.001$, $n=1666$) (Ivanitskaya, 2011) keeping in mind that education was used a proxy for GPA in this research study

Significant predictors of the overall information literacy score were reliance on browsing the Internet for health information and graduate prepared nursing education. This means that nurses who did not rely exclusively on the Internet for health information

and nurses with graduate prepared nursing education were more likely to have a higher overall information literacy score. The education finding is consistent with findings from previous research (Ivanitskaya, 2011).

The amount of variance accounted for by the predictive factors explored in this study was small indicating that perhaps there were other predictors not measured in this study. Perhaps attitudinal factors such as preferring to get information from other sources such as colleagues or textbooks or even how much a nurse believes that information literacy competencies are important to their work as nurse could influence their information literacy.

RRSA-Nurse

The internal consistency reliability was examined for the RRSA-Nurse and it was lower when compared to previous RRSA internal consistency reliability results. Also some portions of the RRSA-Nurse were modified mostly due to low item total correlations and the skewed distributions of some items. Therefore, there is evidence the RRSA-Nurse needs to be modified.

LIMITATIONS OF THE FINDINGS

The present study was limited to RNs at four magnet hospitals included in the region of interest; the results may not be generalizable to the population of RNs at other magnet hospitals. The relationships among variables were obtained from a non-probability sample in a descriptive design, so causal relationships should not be inferred from the data. In addition, the low response rate may have resulted in a non-representative sample.

CONCLUSIONS

The findings of this study indicate that the adapted version of the TIGER recommendations for information literacy were a good conceptual model for examining information literacy in RNs at magnet hospitals. The best predictors for overall information literacy of nurses at magnet hospitals are higher nursing education and nurses' who rely less on the Internet exclusively for health information.

IMPLICATIONS AND RECOMMENDATIONS

The findings have implications for nursing practice, education, and research.

Nursing Leadership, Practice, and Education

Leaders in nursing education and practice should embrace the TIGER recommendations recently published, which encourage the application of a modified version of the American Library Association's Information Literacy Competency Standards for Higher Education to nursing. The TIGER Initiative published several reports and made recommendations for implementing information literacy in nursing leadership, nursing education, and nursing practice (TIGER, 2010). A final report on Staff Development for Informatics Competencies is soon to be published. The TIGER Leadership Development Collaborative has aligned their recommendations with the magnet program.

The TIGER Initiative issued two principal recommendations:

- All practicing nurses and graduating nursing students will have the ability to demonstrate Information Literacy steps 1 through 3 by January 2011 (see Appendix 2).

- All practicing nurses and graduating nursing students will have the ability to demonstrate all 5 Information Literacy steps by January 2013 (see Appendix 2).

The collaborative report on education and faculty development points out that some educational institutions will find it difficult to implement the competencies in their entirety immediately, so the report's authors recommended focusing on the first three competencies for the first year. Once these are achieved by nurses, the other two can be added by January 2013, when all practicing nurses will have command of the five competencies, and incoming nurses will need to demonstrate mastery of—or be helped to obtain mastery of—all five.

The recent report *Evidence and Informatics Transforming Nursing: 3-Year Action Steps toward a 10-year Vision* (2011) contains detailed recommendations for how nursing education and practice can achieve the vision of TIGER. For example one of the recommendations for academic institutions includes “measuring baseline and changes in informatics knowledge among nurse educators and nursing students and among the full range of clinicians seeking continuing education” (TIGER, 2011 page 10). The RRSA-Nurse could be used as a tool to measure this knowledge throughout the curriculum to meet this recommendation. Also, in regards to recommendations for practice, one of the recommendations for healthcare delivery organizations includes “partnering with local educational institutions to offer informatics tools and curricula that support and enhance the use of technology and informatics in practice” (TIGER, 2011 page 12). Again, the RRSA-Nurse could be used to support this recommendation as a potential tool to be used to enhance nurses' information literacy thereby supporting their use of technology and informatics in practice.

- The information literacy of different groups should be analyzed and compared (such as by hospital site) to identify other contributing factors to high information literacy.
- Information literacy and its relationship to nursing sensitive indicators should be explored.
- Study findings suggest that the RRSA-Nurse instrument was not particularly difficult for nurses to complete. Therefore, further refinement of the RRSA-Nurse should be considered, characterized by systematic item analysis and development as well as analyzing validity.
- Information literacy competency should be explored with samples of RNs at other hospitals (non-magnet and magnet-aspiring) and in other geographical areas to identify not only differences but also obtain further data on information literacy competencies of a more diverse sample of RNs especially considering this study had a very select sample. Previous research has shown a statistically significant difference among rural and non-rural freshman in a Georgia university in the ability to obtain health information but not in the ability to evaluate health information and in overall information literacy (Redmond, 2007).
- Information literacy competency should be explored in nursing education to identify gaps and to contribute to curriculum development in schools of nursing.
- Explore the characteristics of magnet hospitals that contribute specifically to information literacy among RNs.
- Qualitative research could reveal more about the concept of information literacy among nurses in hospitals, which could contribute to the development of better instruments to measure the concept in nurses.
- Further research is needed regarding methodological issues of conducting Internet research in magnet hospitals especially survey fatigue among nurses.

SUMMARY

The findings for each research question were reviewed along with study limitations and conclusions. Recommendations for nursing practice, education, and research were provided to suggest future directions for nursing research.

Appendix 1

Association of College & Research Libraries Information Literacy Competency Standards for Higher Education (2000)

Standard One

The information literate student determines the nature and extent of the information needed.

Performance Indicators:

The information literate student defines and articulates the need for information.

Outcomes Include:

Confers with instructors and participates in class discussions, peer workgroups, and electronic discussions to identify a research topic, or other information need

Develops a thesis statement and formulates questions based on the information need

Explores general information sources to increase familiarity with the topic

Defines or modifies the information need to achieve a manageable focus

Identifies key concepts and terms that describe the information need

Recognizes that existing information can be combined with original thought, experimentation, and/or analysis to produce new information

The information literate student identifies a variety of types and formats of potential sources for information.

Outcomes Include:

Knows how information is formally and informally produced, organized, and disseminated

Recognizes that knowledge can be organized into disciplines that influence the way information is accessed

Identifies the value and differences of potential resources in a variety of formats (e.g., multimedia, database, website, data set, audio/visual, book)

Identifies the purpose and audience of potential resources (e.g., popular vs. scholarly, current vs. historical)

Differentiates between primary and secondary sources, recognizing how their use and importance vary with each discipline

Realizes that information may need to be constructed with raw data from primary sources

The information literate student considers the costs and benefits of acquiring the needed information.

Outcomes Include:

Determines the availability of needed information and makes decisions on broadening the information seeking process beyond local resources (e.g., interlibrary loan; using resources at other locations; obtaining images, videos, text, or sound)

Considers the feasibility of acquiring a new language or skill (e.g., foreign or discipline-based) in order to gather needed information and to understand its context
Defines a realistic overall plan and timeline to acquire the needed information

The information literate student reevaluates the nature and extent of the information need.
Outcomes Include:
Reviews the initial information need to clarify, revise, or refine the question
Describes criteria used to make information decisions and choices

Standard Two

The information literate student accesses needed information effectively and efficiently.

Performance Indicators:

The information literate student selects the most appropriate investigative methods or information retrieval systems for accessing the needed information.

Outcomes Include:

Identifies appropriate investigative methods (e.g., laboratory experiment, simulation, fieldwork)

Investigates benefits and applicability of various investigative methods

Investigates the scope, content, and organization of information retrieval systems

Selects efficient and effective approaches for accessing the information needed from the investigative method or information retrieval system

The information literate student constructs and implements effectively-designed search strategies.

Outcomes Include:

Develops a research plan appropriate to the investigative method

Identifies keywords, synonyms and related terms for the information needed

Selects controlled vocabulary specific to the discipline or information retrieval source

Constructs a search strategy using appropriate commands for the information retrieval system selected (e.g., Boolean operators, truncation, and proximity for search engines; internal organizers such as indexes for books)

Implements the search strategy in various information retrieval systems using different user interfaces and search engines, with different command languages, protocols, and search parameters

Implements the search using investigative protocols appropriate to the discipline

The information literate student retrieves information online or in person using a variety of methods.

Outcomes Include:

Uses various search systems to retrieve information in a variety of formats

Uses various classification schemes and other systems (e.g., call number systems or indexes) to locate information resources within the library or to identify specific sites for physical exploration

Uses specialized online or in person services available at the institution to retrieve information needed (e.g., interlibrary loan/document delivery, professional associations, institutional research offices, community resources, experts and practitioners)

Uses surveys, letters, interviews, and other forms of inquiry to retrieve primary information

The information literate student refines the search strategy if necessary.

Outcomes Include:

Assesses the quantity, quality, and relevance of the search results to determine whether alternative information retrieval systems or investigative methods should be utilized

Identifies gaps in the information retrieved and determines if the search strategy should be revised

Repeats the search using the revised strategy as necessary

The information literate student extracts, records, and manages the information and its sources.

Outcomes Include:

Selects among various technologies the most appropriate one for the task of extracting the needed information (e.g., copy/paste software functions, photocopier, scanner, audio/visual equipment, or exploratory instruments)

Creates a system for organizing the information

Differentiates between the types of sources cited and understands the elements and correct syntax of a citation for a wide range of resources

Records all pertinent citation information for future reference

Uses various technologies to manage the information selected and organized

Standard Three

The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.

Performance Indicators:

The information literate student summarizes the main ideas to be extracted from the information gathered.

Outcomes Include:

Reads the text and selects main ideas

Restates textual concepts in his/her own words and selects data accurately

Identifies verbatim material that can be then appropriately quoted

The information literate student articulates and applies initial criteria for evaluating both the information and its sources.

Outcomes Include:

Examines and compares information from various sources in order to evaluate reliability, validity, accuracy, authority, timeliness, and point of view or bias

Analyzes the structure and logic of supporting arguments or methods

Recognizes prejudice, deception, or manipulation

Recognizes the cultural, physical, or other context within which the information was created and understands the impact of context on interpreting the information

The information literate student synthesizes main ideas to construct new concepts.

Outcomes Include:

Recognizes interrelationships among concepts and combines them into potentially useful primary statements with supporting evidence

Extends initial synthesis, when possible, at a higher level of abstraction to construct new hypotheses that may require additional information

Utilizes computer and other technologies (e.g. spreadsheets, databases, multimedia, and audio or visual equipment) for studying the interaction of ideas and other phenomena

The information literate student compares new knowledge with prior knowledge to determine the value added, contradictions, or other unique characteristics of the information.

Outcomes Include:

Determines whether information satisfies the research or other information need

Uses consciously selected criteria to determine whether the information contradicts or verifies information used from other sources

Draws conclusions based upon information gathered

Tests theories with discipline-appropriate techniques (e.g., simulators, experiments)

Determines probable accuracy by questioning the source of the data, the limitations of the information gathering tools or strategies, and the reasonableness of the conclusions

Integrates new information with previous information or knowledge

Selects information that provides evidence for the topic

The information literate student determines whether the new knowledge has an impact on the individual's value system and takes steps to reconcile differences.

Outcomes Include:

Investigates differing viewpoints encountered in the literature

Determines whether to incorporate or reject viewpoints encountered

The information literate student validates understanding and interpretation of the information through discourse with other individuals, subject-area experts, and/or practitioners.

Outcomes Include:

Participates in classroom and other discussions

Participates in class-sponsored electronic communication forums designed to encourage discourse on the topic (e.g., email, bulletin boards, chat rooms)

Seeks expert opinion through a variety of mechanisms (e.g., interviews, email, listservs)

The information literate student determines whether the initial query should be revised.

Outcomes Include:

Determines if original information need has been satisfied or if additional information is needed

Reviews search strategy and incorporates additional concepts as necessary

Reviews information retrieval sources used and expands to include others as needed

Standard Four

The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.

Performance Indicators:

The information literate student applies new and prior information to the planning and creation of a particular product or performance.

Outcomes Include:

Organizes the content in a manner that supports the purposes and format of the product or performance (e.g. outlines, drafts, storyboards)

Articulates knowledge and skills transferred from prior experiences to planning and creating the product or performance

Integrates the new and prior information, including quotations and paraphrasings, in a manner that supports the purposes of the product or performance

Manipulates digital text, images, and data, as needed, transferring them from their original locations and formats to a new context

The information literate student revises the development process for the product or performance.

Outcomes Include:

Maintains a journal or log of activities related to the information seeking, evaluating, and communicating process

Reflects on past successes, failures, and alternative strategies

The information literate student communicates the product or performance effectively to others.

Outcomes Include:

Chooses a communication medium and format that best supports the purposes of the product or performance and the intended audience

Uses a range of information technology applications in creating the product or performance

Incorporates principles of design and communication

Communicates clearly and with a style that supports the purposes of the intended audience

Standard Five

The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

Performance Indicators:

The information literate student understands many of the ethical, legal and socio-economic issues surrounding information and information technology.

Outcomes Include:

Identifies and discusses issues related to privacy and security in both the print and electronic environments

Identifies and discusses issues related to free vs. fee-based access to information

Identifies and discusses issues related to censorship and freedom of speech

Demonstrates an understanding of intellectual property, copyright, and fair use of copyrighted material

The information literate student follows laws, regulations, institutional policies, and etiquette related to the access and use of information resources.

Outcomes Include:

Participates in electronic discussions following accepted practices (e.g. "Netiquette")

Uses approved passwords and other forms of ID for access to information resources

Complies with institutional policies on access to information resources

Preserves the integrity of information resources, equipment, systems and facilities

Legally obtains, stores, and disseminates text, data, images, or sounds

Demonstrates an understanding of what constitutes plagiarism and does not represent work attributable to others as his/her own

Demonstrates an understanding of institutional policies related to human subjects research

The information literate student acknowledges the use of information sources in communicating the product or performance.

Outcomes Include:

Selects an appropriate documentation style and uses it consistently to cite source

Posts permission granted notices, as needed, for copyrighted material

Appendix 2

TIGER Recommendations-Information Literacy Competencies

All practicing nurses and graduating nursing students will have the ability to:

1. Knowledge - Determine the nature and extent of the information needed.
 - 1.1 Recognize a specific information need
 - 1.2 Focus and articulate the information need into a researchable question.
 - 1.3 Understand that the type and amount of information selected is determined in part by the parameters of the need, as well as by the information available.
2. Access - Access needed information effectively and efficiently.
 - 2.1 Recognize the availability of a variety of sources and of assistance with using them.
 - 2.2 Identify types of information resources in a variety of formats (e.g., primary or secondary, journals, policies and procedures, electronic references) and understand their characteristics.
 - 2.3 Select types of information resources appropriate to a specific information need.
 - 2.4 Understand that different information sources and formats require different searching techniques, including browsing.
 - 2.5 Select the search strategies appropriate to the topic and resource.
 - 2.5 Understand that various resources may use different controlled vocabularies to refer to the same topic.
 - 2.6 Use search language appropriate to the source, such as a controlled vocabulary, key words, natural language, author and title searches to locate relevant items in print and electronic resources.
 - 2.7 Use online search techniques and tools to locate relevant citations and to further refine the search.
 - 2.8 Understand that the Internet may be a useful resource for locating, retrieving and transferring information electronically.
 - 2.9 Understand how to use classification systems and their rationale.
3. Evaluate information and its sources critically and incorporates selected information into his or her knowledge base and value system
 - 3.1 Understand that search results may be presented according to various ordering principles (e.g., relevance ranking, author, title, date, or publisher).
 - 3.2 Assess the number and relevance of sources cited to determine whether the search strategy must be refined.
 - 3.3 Use the components of a citation (e.g., currency, reputation of author or source, format, or elements of a URL) to choose those most suitable for the information need.

3.4 Perceive gaps in information retrieved and determine whether the search should be refined.

3.5 Understand that the Internet may be a useful resource for locating, retrieving and transferring information electronically.

3.6 Use a variety of criteria, such as author's credentials, peer review, and reputation of the publisher, to assess the authority of the source.

3.7 Assess the relevancy of a source to an information need by examining publication date, purpose, and intended audience.

3.8 Recognize omission in the coverage of a topic.

3.9 Distinguish between primary and secondary sources in different disciplines and evaluate their appropriateness to the information need.

3.10 Apply evaluation criteria to all information formats.

3.11 Integrate the new information into existing body of knowledge.

4. Individually or as a member of a group, use information effectively to accomplish a specific purpose

4.1 Recognize and evaluate documentation for the information source, such as research methodology, bibliography or footnotes.

4.2 Use appropriate documentation style to cite sources used.

4.3 Summarize the information retrieved (e.g., write an abstract or construct an outline).

4.4 Recognize and accept the ambiguity of multiple points of view.

4.5 Organize the information in a logical and useful manner.

4.6 Synthesize the ideas and concepts from the information sources collected.

4.7 Determine the extent to which the information can be applied to the information need.

4.8 Create a logical argument based on information retrieved.

5. Evaluate outcomes of the use of information

5.1 Describe the criteria used to make decisions and choices at each step of the particular process used.

5.2 Assess effectiveness of each step of the process and refine the search process in order to make it more effective.

5.3 Understand that many of the components of an information seeking process are transferable and, therefore, are applicable to a variety of information needs.

5.4 Understand the structure of the information environment and the process by which both scholarly and popular information is produced, organized and disseminated.

5.5 Understand the ethics of information use, such as knowing how and when to give credit to information and ideas gleaned from others by appropriately citing sources in order to avoid plagiarism.

5.6 Respect intellectual property rights by respecting copyright.

5.7 Understand concepts and issues relating to censorship, intellectual freedom, and respect for differing points of view.

5.8 Understand the social/political issues affecting information, such as:

- a) privacy
- b) privatization and access to government information
- c) electronic access to information
- d) the exponential growth of information
- e) equal access to information

Appendix 3

RRSA-Nurse: Ability to access information (Access) items

Note: Correct answers to items are indicated in **bold**.

1. I'll get the most documents when I search an online database for:

Fever and infection

Fever not infection

Fever or infection

Not fever infection

Or fever and infection

The participant must choose the correct Boolean term to use. If the respondent chooses the correct answer, a score of 1 is earned; all other choices will result in a score of 0.

2. If I type "alternative medicine" in an online general search engine, such as Google or Yahoo, and click "Search" I will most likely find...(Check all that apply)

a complete list of health organizations that offer alternative medicine

guidance on what alternative medicine therapy is best

links to documents that prove that alternative medicine treatments are safe

a list of all medical products related to alternative medicine

an overwhelmingly large number of resources on a variety of topics

none of the above

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

3. Which of the following titles are scholarly or academic journals? Check all that apply.

3a. U.S. News and World Report

3b. Health Services Research

3c. Time

3d. Journal of the American Medical Association

3e. The Wall Street Journal

This question consists of 5 true-false items. A maximum of 5 points are possible if the respondent selects two academic journals (2 correct positives) and if the respondent does not select three non-journal sources (3 correct negatives). A false positive or a false negative answer is assigned a score of 0.

4. A journal article abstract is...

a list of references

a summary of the article's content (purpose, method, results & conclusions)

a summary of other research on this topic

a note about the authors of the article

a list of abstract concepts used in the journal
A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

5. A bibliography is...

- a book about a person's life
 - a book of charts and graphs
 - a list of references or citations**
 - a directory of names
 - Bible geography--a historical perspective into where the Bible events occurred
- A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

6. Which of these citations are to articles from scholarly health journals? Check all that apply:

6a. Jaeschke, R., Guyatt, G., & Lijmer, J. (2002). Diagnostic tests. In G. Guyatt, D. Rennie (Eds.), *Users' Guides to the Medical Literature* (pp. 121-140). Chicago: AMA.

6b. Bright B. (2007). Benefits of electronic health records seen as outweighing privacy risks. *The Wall Street Journal*. Retrieved Oct 6, 2009, from <http://online.wsj.com/article/SB119565244262500549.html>

6c. Lowe, J. I., & Herranen, M. (1982). Understanding teamwork: Another look at concepts. *Social Work in Health Care*, 7(2), 1-11.

6d. De Vellis, R. F. (1991). *Scale Development: Theory and Applications*. Newbury Park, CA: Sage.

6e. Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (Eds.). (1999). *To Err is Human: Building a Safer Health Care System*. Washington, DC: National Academy Press.

6f. Ganz, P. A. (2002). What outcomes matter to patients: A physician-researcher point of view. *Medical Care*, 40, 11-19.

6g. None of the above.
This question consists of 6 true-false items. A maximum of 6 points are possible if the respondent selected three journal articles (2 correct positives) and if the respondent did not select two non-journal sources (4 correct negatives). A false positive or a false negative answer is assigned a score of 0.

7. When quoting information about the impact of inadequate nurse staffing on patient health, it is best to use:

- the most up-to-date webpage found on the Internet
- a peer-reviewed journal article**
- a conversation overheard by an instructor
- a quote from a newsletter

services provided by a very experienced lawyer
A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

8. You are interested in gathering information about osteoporosis medication, but are not interested in estrogen. Set up a document in a separate window using the following keywords: osteoporosis estrogen. Click here to begin your search. Report the number of documents you found:

255

555

700

11164

55164

This question contains a link that opens an interactive application that is similar to a library search engine. Depending on the Boolean operator selection and the order of the keywords, the application will give a different number of documents. A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

9. Which of the following materials are primary and not secondary sources of information? Check all that apply.

9a. A physiology textbook

9b. A Mayo Clinic annual report

9c. Your medical record

9d. A newspaper article about the number of deaths due to homicide

9e. A summary of empirical studies that had the greatest impact on health policy

This question consists of 5 true-false items. A maximum of 5 points are possible if the participant selects 2 primary information sources (2 correct positives) and does not select 3 secondary information sources (3 correct negatives). A false positive or a false negative answer is assigned a score of 0.

10. You have found a good reference for your research paper. It is a book edited by Williams and others. The book title is The Epidemiology of Diabetes Mellitus: An International Perspective. Find it by searching The University of Texas at Austin Libraries Online Catalog: <http://www.lib.utexas.edu>. What is the CALL NUMBER of this book?

RA645.D5 E651 2001

RA645.D5 E652 2001

RA645.D5 E653 2001

RA645.D5 E654 2001

RA645.D5 E655 2001

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

11. A complete citation is needed to obtain an article or a book. Which of the following citations lack important information? Check all that apply.

11a. LoGerfo, J. P., & Rubenstein, L. Z. (2003). Preventing falls in elderly persons. *New England Journal of Medicine*, 348(18), 1816-1818.

11b. Improving public health through policy advocacy (April). Community-based Public Health Policy & Practice, 8, 1-8.

11c. Wheeler, L. (2003). Asthma management in schools. FDA Consumer, 37(2).

11d. McNulty, T., & Ferlie, E. (2002). Reengineering health care: the complexities of organizational transformation.

11e. Loue, S., Lloyd, L.S., & O'Shea, D. (2003). *Community Health Advocacy*. New York, NY: Kluwer Academic Publishers/Plenum. This question consists of 5 true-false items. A maximum of 5 points are possible if the participant correctly selects 3 complete citations (3 correct positives) and did select 2 incomplete citations (2 correct negatives). A false positive or a false negative answer is assigned a score of 0.

12. A <http://www.hospitalcompare.hss.gov> tool gives information on how well hospitals care for patients. What hospital in Toledo, Ohio has the highest percentage of surgery patients who were given an antibiotic at the right time (within one hour before surgery) to help prevent infection? (Tip: use a general search option in Hospital Compare).

St Anne Mercy Hospital

The Toledo Hospital

University of Toledo Medical Center

a, and b have equally high percents

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

Appendix 4

RRSA-Nurse Evaluation of Information (Evaluation) items

Note: Correct answers to items are indicated in **bold**.

You have found three articles on learning disabilities. Click on the links below to examine each article and evaluate its content.

1. Which article is the most commercial because it aims to sell?

On the Lookout for Learning Disabilities

Overcoming Learning Disorders

Teaching Students with Learning Disabilities

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

2. Which article includes the best review of existing research on learning disabilities?

On the Lookout for Learning Disabilities

Overcoming Learning Disorders

Teaching Students with Learning Disabilities

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

3. Which article was most likely written before the other articles were?

On the Lookout for Learning Disabilities

Overcoming Learning Disorders

Teaching Students with Learning Disabilities

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

4. Which article was written by an author whose affiliation is unknown?

On the Lookout for Learning Disabilities

Overcoming Learning Disorders

Teaching Students with Learning Disabilities

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

5. Prior to its publication, which article was most likely to pass through a rigorous review of experts?

On the Lookout for Learning Disabilities

Overcoming Learning Disorders

Teaching Students with Learning Disabilities

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

You are looking for information on various nutritional supplements. You found three web sites. Click on the links below to examine each site and evaluate its content.

6. Which of these websites is the most trustworthy?

Cognitogenic aids

Dormitogenic aids

Vescorogonic (gustatogenic) aids

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

7. What are the most likely purposes of the vesoscorogenic (gustagenic) aids web site?

To assist a large number of people in achieving their weight loss goals

To educate people how to regulate appetite

To promote research on how vescorogenic (gustatogenic) aids inhibit body fat biosynthesis

To sell John Goode's services, vescorogenic (gustatogenic) aids or both

To explain that not all "diet drugs" are vescorogenic (gustatogenic) aids

To provide evidence on how vescorogenic (gustatogenic) aids helped specific people get healthy

A score of 1 is earned for the correct answer; 0 is assigned to all other response options selected.

Check statements that are true about the three web sites you evaluated. Check all that apply.

8a. I may recommend that people suffering from learning disabilities take supplements described in cognitogenic aids

8b. I may recommend that people suffering from sleeping disorders take supplements described in dormitogenic aids

8c. I may recommend that people suffering from obesity take supplements described in vescorogenic (gustatogenic) aids

8d. All three websites make a good case for taking nutritional supplements

8e. None of the websites makes a good case for taking nutritional supplements

A maximum of 5 points are possible for this question, including 1 point for a correct positive and 1 point for each of the 4 correct negatives. A false positive or a false negative answer will be assigned a score of 0.

Someone you know has had a very high fever for six days and suspects she has flu. She needs to be advised on what sort of treatment may be best for her. What sources of information will be most appropriate for this individual. Check all that apply.

- 9a. The most up-to-date page on fever symptoms found on the web
- 9b. Self-help health websites for flu patients
- 9c. A medical doctor, nurse or another health care provider**
- 9d. A recent newspaper article about flu cases in your area
- 9e. Top websites that appear on the first page of results in Google, Yahoo or another engine after searching for "fever symptoms, causes, treatment and drugs"
- 9f. Online testimonials by flu patients
- 9g. None of the above

This question consists of 7 true-false items. A maximum of 7 points are possible if the respondent selects 1 true statement (1 correct positive) and does not select 6 false statements (6 correct negatives). A false positive or a false negative answer is assigned a score of 0.

Click here to view an announcement. Verify if Doctor C.C. Thomas is a physician licensed by the American Medical Association (AMA) to practice in Hawaii. Follow this link to search Doctor Finder for Patients by AMA: <http://webapps.ama-assn.org/doctorfinder/html/patient.html>. Given the announcement and the AMA's Doctor Finder information, which of the following facts can you confirm?

- 10a. Doctor C. C. Thomas is an AMA member who practices in Hawaii
- 10b. Doctor C. C. Thomas is not an AMA member but his practice is in Hawaii
- 10c. Doctor C. C. Thomas offers an effective new cure
- 10d. Doctor C. C. Thomas works with the World Health Organization (WHO)
- 10e. None of the above**

This question consists of 6 true-false items. A maximum of 6 points are possible if the respondent selects 1 true statement (1 correct positive) and does not select 5 false statements (5 correct negatives). A false positive or a false negative answer is assigned a score of 0.

The author of a webpage states that type 2 diabetes can be prevented. He uses these sources to support his statement:

Tuomilehto J, Lindstrom J, Eriksson JG, et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med* 2001;344:1343-1350.

Knowler WC, Barret-Conner E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002;346:393-403.

Which of the following statements are true? (Tip-Use any way you want to answer this question but do not spend too much time verifying any one statement).

11a. The webpage contains accurate information.

11b. There is little research on type 2 diabetes prevention.

11c. The author of the webpage proved that diabetes can be prevented.

11d. The sources are articles.

11e. The sources are books.

11f. The sources are from a scientific journal.

11g. For each source cited, a summary of its contents is available online, free-of-charge.

This question consists of 7 true-false items. A maximum of 7 points are possible if the respondent selects 4 true statements (4 correct positives) and does not select 3 false statements (3 correct negatives). A false positive or a false negative answer is assigned a score of 0.

Appendix 5

RRSA-Nurse Personal Factors

Self-perceived abilities (Self-perception)

My ability to research health topics is...

[Help](#)

Click on this line to answer

0=Very poor

Excellent=10

My ability to judge the quality of health information is...

[Help](#)

Click on this line to answer

0=Very poor

Excellent=10

My ability to find information on a specific health topic...

[Help](#)

Click on this line to answer

0=Very poor

Excellent=10

My ability to research health topics at my present skill level is...

[Help](#)

Click on this line to answer

0=Very poor

Excellent=10

Reliance on browsing the Internet (Reliance on browsing)

1. To find answers to my patients' questions about their personal health, the best place to start is the Internet.

[Help](#)

Click on this line to answer

0=Strongly disagree

Strongly agree=10

2. I can answer my patients' questions about their personal health by only browsing websites.

[Help](#)

Click on this line to answer

0=Strongly disagree

Strongly agree=10

3. The quality of health information found through web search engines, such as Google or Yahoo, is usually higher than health information in libraries.

[Help](#)

Click on this line to answer

0=Strongly disagree

Strongly agree=10

4. Unrestricted access to Internet resources has practically eliminated the need for libraries, library staff members, printed books and journals.

[Help](#)

Click on this line to answer

0=Strongly disagree

Strongly agree=10

5. More often than not, only browsing web sites can provide me with the most important

[Help](#)

Click on this line to answer

0=Strongly disagree

Strongly agree=10

Library and research experience in accessing information (Experience)

1. Which of the following have you ever done? Check all that apply.
- a. Looked for information online to prepare for a doctor's appointment
 - b. Looked for information online as a follow-up to a doctor's appointment
 - c. Ordered medicines, dietary supplements or health products from an online pharmacy**
 - d. Used the web or email to discuss my health with a doctor, a nurse or other health provider**
 - e. When asked for help, found health information online for someone else
 - f. Shared online health information I discovered by chance with another person who might find it useful
 - g. Told someone else how to look up a health topic on the web
 - h. Told someone else how to make sense of the results of an online health search
 - i. None of the above**

Item c, d and i receive zero points if checked, all other items receive one point each if marked.

2. When I look for health information, most of the time, I (check all that apply).
- a. Check to see who gives the information on the health websites I visit
 - b. Check to see who sponsors the health websites I visit
 - c. Check to see when the information on a health website was last updated or reviewed by a medical professional
 - d. Check to see if the publication passed a scientific review
 - e. Check to see if the author gives facts that explain why something is better or worse
 - f. Check to quality of sources cited by the authors**
 - g. Start my search in a general search engine like Google or Yahoo**
 - h. Start my search by going right to a specific website I know**
 - i. Start my search on a library website.
 - j. None of the above**

Items g, h, and j receive zero point each if checked. Item f receives 3 points if checked. All other items receive one point each if checked.

3. Because of the health information I personally found online for myself or a patient, a decision was made (check all that apply).
- a. How to treat a specific illness or condition
 - b. To see (or not to see) a doctor
 - c. To ask a doctor new questions
 - d. To follow doctor's instructions, such as take a prescribed drug or follow treatment steps
 - e. To get a second opinion from another doctor

- f. To change medication, such as add a new drug or stop taking a drug
- g. To change an overall approach to maintaining health
- h. To change an approach to diet or exercise
- i. To change an approach to coping with a chronic condition
- j. To change an approach to managing pain

k. None of the above

Item 3k receives zero points if checked. All other items receive 1 point each if checked.

4. Which of the following have you ever done or used? Check all that apply:

- a. Download - copying a file from a remote computer or server to your own computer
- b. Upload - copying a file from your computer to another computer, the opposite of download
- c. Advanced search - using more than one search term**
- d. Preference setting - modifying options in computer programs
- e. Refresh or reload - updating the current window with the latest data
- f. MP3 - A music file format
- g. Newsgroup - an online discussion group focusing on a specific topic
- h. PDF - a file format designed to view documents exactly as they were created
- i. None of the above

Item c receives one point if checked. All other items receive zero points each if checked.

5. In the past 12 months, I... Check all that apply:

- a. Talked to a library staff member about research health topics**
- b. Searched a database with articles from medical or health journals, such as MEDLINE/PubMed, PsycINFO, CINAHL**
- c. Read a document that reviewed research evidence from 5+ health studies to suggest best practices
- d. Read a review of health studies that explained which research findings were high quality and which were not**
- e. Read a document that compared the outcomes, costs or availability of several health interventions (or therapies/treatments)**
- f. Read an original study in which authors gathered and analyzed their own data to answer a health-related question
- g. Reviewed summarized suggestions on the best course of action (for diagnosis, care or prevention) from Cochrane, National Guideline Clearinghouse, InfoPOEMS, ACP PIER or U.S. Preventive Services Task Force**
- h. None of the above**

Items a, b, e, and g received three points each if marked. Item d received two points if checked. Item h received zero points if checked. All other items received one point each if checked.

Appendix 6

RRSA-Nurse Background Items

As of today, what is your highest level of earned nursing education?

Diploma
Associate's
Bachelor's
Master's
Doctoral

How many credits have you earned toward your next nursing degree? For example, if you are an undergraduate, count the number of Bachelor credits you've earned.

None
1-9
10-24
25-40
41-70
71-100
101 or more

How long has it been since receiving your highest nursing degree?

Less than one year
1-2 years
3-4 years
5-6 years
7-10 years
More than 11 years

My age in years is:

[Help](#)
 Click on this line to answer

18

73

My gender:

Female
Male

What do you consider your primary professional role?

Administration

Clinical practice
Education
Other-Please specify

What is your current employment status?

Nursing, full time
Nursing, part time
Working, not in nursing, full time
Working, not in nursing, part time

Do you have access to a computer with Internet access at home?

Yes
No

Is Internet access provided anywhere in your facility?

Yes
No

If the Internet is provided at your facility, who is access provided for? Check all that apply.

All staff nurses
Advanced practice nurses
Nurse managers
All staff members
Nursing students
Do not know
Not applicable

If the Internet is provided at your facility, where is it accessed? Check all that apply.

On patient unit/nurses' station
In unit manager's office
In staff lounge
In library
Other location
Do not know
Not applicable

Have you participated in the Nursing Research Fellowship?

Yes
No

Thinking about the last year, have you attended any conferences, workshops or programs related to the ability to find and access health information?

Yes
No

Which of the following technical problems did you experience while completing this assessment? Check all that apply:

No problems
Nothing opened when I clicked on the links
Sliders did not work
Links opened pages but some pages didn't work

How many contacts with library staff members did you have during the past year? Count the total number of face-to-face, fax, e-mail, or any other type of contacts.

10+ contacts
6-9 contacts
4-5 contacts
2-3 contacts
1 contact
None

On average, how frequently do you access a library web site?

Every day
Several times a week
Once a week
Every 2 weeks
Once a month
Less than once a month

How often did you use libraries during the past year? Include library visits, online access to library resources, contacts with library staff members, etc.

Every day
Several times a week
Once a week
Every 2 weeks
Once a month
Less than once a month

On average, how often did you use the Internet during the past year?

Every day
Several times a week
Once a week
Every 2 weeks
Once a month
Less than once a month

Appendix 7

Letter of support from Nursing Leadership at Study Sites



TO: Kim Belcik, Doctoral candidate in Nursing, The University of Texas at Austin, School of Nursing

FROM: Joyce Batcheller, Senior Vice President/Network Chief Nursing Officer, Seton Family of Hospitals
Jo Keisman, Senior Director of Nursing Practice, Seton Northwest Hospitals
Melanie Fox, Chief Nursing Officer, Seton Northwest Hospital
Leah May, Chief Nursing Officer, University Medical Center Brackenridge
Angela Stalbaum, Chief Nursing Officer, Seton Medical Center Austin
Yvonne VanDyke, Vice President Nursing Services, Education, and Research, Seton Family of Hospitals and Administrator Clinical Education Center at Brackenridge
Robert Walsh, Chief Nursing Officer, Dell Children's Medical Center of Central Texas

SUBJECT: Letter of support for "Information Literacy of Registered Nurses at Magnet Hospitals", Doctoral dissertation proposal

DATE: September 15, 2009

We are pleased to support your doctoral dissertation proposal to investigate the information literacy competencies of registered nurses at the four Magnet hospitals within the Seton Family of Hospitals pending final institutional review board approval by The University of Texas at Austin and the Seton Clinical Research Steering Committee. We understand that the study intends to measure the proficiency of registered nurses in searching for and evaluating electronic health information and gives registered nurses valuable feedback mechanisms to help them improve their searching skills.

We are excited that this proposal affords the Seton Family of Hospitals an opportunity to learn more about the skills necessary to prepare nurses to take part in evidence based practice and research. It will blend closely with our efforts to meet the Magnet goals we have set for assessing and educating nurses in evidence based practice and research.

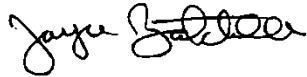
A key aspect of your dissertation is its innovation in serving not only as an assessment of information literacy competencies but also as an intervention aimed at building competencies.

1345 Philomena St. • Austin, Texas 78723 • (512) 324-1000 • www.seton.net

Our mission inspires us to care for and improve the health of those we serve with a special concern for the sick and the poor.
We are called to Service of the Poor, Reverence, Integrity, Wisdom, Creativity and Dedication.

Our past collaborative efforts with The University of Texas at Austin School of Nursing have shown how nursing research can result in winning outcomes for all. We look forward to continued victories, as we implement this ambitious project.

Sincerely,



Joyce Batcheller, MSN, RN, NEA-BC
Seton Family of Hospitals
1345 Philomena Street, Suite 402
Austin, Texas 78723

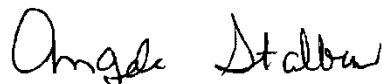
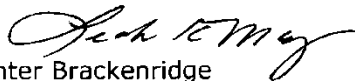
Melanie Fox, MSN, RN, NEA-BC
Seton Medical Center Williamson
201 Seton Parkway
Round Rock, TX 78665



Jo Keisman, RN, MBA
Seton Northwest Hospital
11113 Research Boulevard
Austin, Texas 78759



Leah May, MSN, RNC
University Medical Center Brackenridge
601 East 15th Street
Austin, Texas 78701



Angela Stalbaum, MSN, RN, NE-BC
Seton Medical Center Austin
1201 West 38th Street
Austin, Texas 78705

Yvonne VanDyke

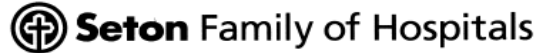
Yvonne VanDyke, MSN, RN
Seton Family of Hospitals
Clinical Education Center at Brackenridge
1400 North I-35, Suite 2.404
Austin, Texas 78701

Robert Walsh, MSN, RN

Robert Walsh, MSN, RN, CPN, NEA-BC
Dell Children's Medical Center of Central Texas
4900 Mueller Boulevard
Austin, Texas 78723

Appendix 8

Permission letter from Seton Family of Hospitals



January 21, 2010

*Kim Belcik, BS, BSN, RN-BC
UT Austin, School of Nursing
1700 Red River
Austin, TX 78701*

Re: CR-10-034 Information Literacy Competencies of Registered Nurses at Magnet Hospitals

Dear Ms. Belcik:

On January 20, 2010 the Seton Clinical Research Steering Committee (CRSC) conditionally approved the above mentioned study to be conducted at University Medical Center at Brackenridge, Seton Medical Center Austin, Dell Children's Medical Center of Central Texas, and Seton Northwest Hospital. This approval is contingent upon resolution of issues regarding the use of Seton assets and recruiting methods.

Please be aware that this approval is contingent upon compliance with all Seton policies regarding the proper conduct of clinical research. In addition, please note the following:

No study may take place in the Seton Family of Hospitals until:

- 1) The Clinical Research Steering Committee has received your IRB Approval letter;**
- 2) The Clinical Research Steering Committee has received a consent form or waiver of consent form for your study which meets Seton requirements;**
- 3) There is an executed contract in place, if needed, prior to the study beginning.**

Seton policy also requires the following:

All Investigators conducting research within Seton facilities must ensure that study coordinators have informed admission personnel immediately of any patient enrolled in their study. All Investigators follow proper billing procedures for all costs incurred outside of standard of patient care. As part of our continual process improvement, we will randomly review research patient bills to ensure Seton Family of Hospitals research billing compliance.

All personnel who are not employed by SETON, but who will be providing healthcare services related to a research Study, must be credentialed by SETON Medical Staff

Office of Research Administration • 1400 N IH 35, Suite C2.230 • Austin, TX 78701 • (512) 324-7991 • fax: (512) 324-7792 • www.seton.net

Our mission inspires us to care for and improve the health of those we serve with a special concern for the sick and the poor.
We are called to Service of the Poor, Reverence, Integrity, Wisdom, Creativity and Dedication.

Services and proof of credentialing must be provided in writing to the Office of Research Administration.

At the conclusion of your study, the CRSC requires a closure summary that includes the number of participants enrolled and your comments regarding the success of the project.

Seton is supportive of this important research project that is particularly significant for the patient community. On behalf of the Seton Family of Hospitals, I wish you much success in conducting and completing this project.

Please let me know if I can be of any further assistance in initiating your project with the Seton Family of Hospitals.

Sincerely,

A handwritten signature in black ink that reads "Thos Caven MD". The signature is written in a cursive, slightly slanted style.

Thomas Caven, M.D.
Chair, Clinical Research Steering Committee

TC: bb

Appendix 9

Email to Participants

From: Kim Belcik
Subject: Information Literacy Research Request

Dear Registered Nurse:

My name is Kim Belcik and I am a doctoral candidate at The University of Texas at Austin and a staff RN at Seton Northwest Hospital. I am completing my doctoral dissertation on information literacy competencies of registered nurses at Magnet hospitals. As a registered nurse at a Magnet designated hospital, I would like to invite you to participate in a survey entitled “Research Readiness Self-assessment for Nurses.”

If you would like to learn more about the study, please see the information and study link below.

If you complete the survey you will be eligible to enter a drawing for one of three \$50 gift cards. After completing the survey, you will be directed to enter your contact information, if you choose, into the drawing.

If you have any questions about this study, please contact Kim Belcik at kbelcik@mail.utexas.edu or (512) 232-2740.

You are invited to participate in a survey, entitled “Information literacy competencies of registered nurses at magnet hospitals.” The study is being conducted by Kim Belcik, School of Nursing of The University of Texas at Austin, 1700 Red River Street, 512-232-2740, kbelcik@mail.utexas.edu

The purpose of this study is to examine the information literacy competencies of registered nurses at magnet hospitals. Your participation in the survey will contribute to a better understanding of information literacy in registered nurses. We estimate that it will take about 35 minutes of your time to complete the questionnaire. You are free to contact the investigator at the above address and phone number to discuss the survey.

Risks to participants are considered minimal. There will be no costs for participating. One of the benefits of participating includes receiving immediate feedback concerning your ability to search and judge electronic health information. Identification numbers associated with email addresses will be kept during the data collection phase for tracking purposes only. A limited number of research team members will have access to the data during data collection. This information will be stripped from the final dataset.

Your participation in this survey is voluntary. You may decline to answer any question and you have the right to withdraw from participation at any time without penalty. If you wish to withdraw from the study or have any questions, contact the investigator listed above.

If you have any questions or would like us to email another person for your institution or update your email address, please call Kim Belcik at 512-232-2740 or send an email to kbelcik@mail.utexas.edu. You may also request a hard copy of the survey from the contact information above.

To participate, please click on the link below:
http://rrsa.cmich.edu/cgi-bin/rrsahp_utx.cgi/CP?action=securelogin

and enter the 6-digit enrollment key for your site, Dell Children's Medical Center of Central Texas 464270; Seton Medical Center at Austin 463956; Seton Northwest Hospital 463799; University Medical Center at Brackenridge 464113.

If you do not want to receive any more reminders, you may email us at kbelcik@mail.utexas.edu.

This study has been reviewed and approved by The University of Texas at Austin Institutional Review Board. If you have questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact - anonymously, if you wish - the Institutional Review Board by phone at (512) 471-8871 or email at orisc@uts.cc.utexas.edu.

IRB Approval Number: [2009-06-0043]

If you agree to participate go to the website cited above. Otherwise use the X at the upper right corner to close this window and disconnect.

Thank you for your help.
Kim Belcik, BSN, RN
Phone: (512) 232-2740

Appendix 10

Item-Total Correlations for Items in the Accessing Information Scale (N=120)		
Item	Corrected Item-Total Correlation	KR20 if Item Deleted
1.	.254	.612
2.	.186	.621
3a.	.323	.616
3b.	.162	.624
3c.	.385	.613
3e.	.186	.623
4.	.379	.609
5.	.284	.612
6a.	.208	.617
6b.	.277	.621
6c.	.340	.600
6d.	.063	.629
6e.	.173	.621
6f.	.197	.619
7.	.385	.606
8.	.209	.618
9a.	.148	.626
9b.	-.001	.643
9c.	.274	.610
9d.	.295	.614
9e.	-.013	.638

10.	.111	.628
11a.	.183	.622
11b.	.205	.618
11c.	.201	.619
11d.	.382	.599
11e.	-.086	.656
12.	.280	.609

Note. See Appendix 3 for detailed item descriptions.

Appendix 11

Item-Total Correlations for Items in the Evaluating Health Information Scale (N=119)

Item	Corrected Item-Total Correlation	KR20 if Item Deleted
1.	.224	.606
2.	.259	.603
3.	.124	.616
4.	.048	.622
5.	.293	.602
6.	-.044	.642
7.	.339	.596
8a.	.207	.608
8b.	.220	.606
8c.	.244	.608
8d.	.427	.582
8e.	.479	.566
9a.	.232	.604
9b.	.124	.615
9c.	.120	.615
9d.	.222	.607
9e.	.144	.616
9f.	.079	.618
10a.	.063	.618
10b.	.242	.603
10c.	.136	.615

10d.	.120	.616
10e.	.374	.585
11a.	.176	.611
11b.	.093	.617
11c.	.235	.607
11d.	.037	.629
11e.	.263	.608
11f.	.155	.613
11g.	-.089	.647

Note. See Appendix 4 for detailed item descriptions.

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Vita

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This dissertation was typed by the author.